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It Is Time to Start the Cure . . . . . *By R. B. Douglas* 1

Westinghouse Reports on Carbide Dies . . . . . *By Gilbert P. Muir* 17

Regrinding of Jaws for Self-Centering Chucks . . . *By J. R. Paquin* 21

Chemical Surface Treatments for Metals . . . . . *By A. E. Durkin* 22

Gray Iron as a Die Material . . . . . *By C. O. Burgess* 26

Dies for Swaging Operations . . . . . *By John Mueller* 28

Ingenious Tooling Solves Broaching Problem . . . *By A. E. Rylander* 31

Portable Jig Borer 32

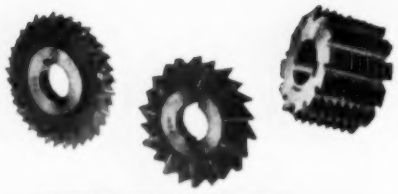
Design and Manufacture of Forming Rolls . . *By A. W. Baumgartner* 35

Punch Press Tools for Cutting . . . . . *By J. W. Lengbridge* 37

Tool Engineering Data 43

Departments

Andygrams, 60 ● ASTE News, 45 ● Gadgets, 41 ● North, East, West, South in Industry, 59 ● Tools of Today, 62 ● Trade Literature, 61 ● Advertisers Index, 126



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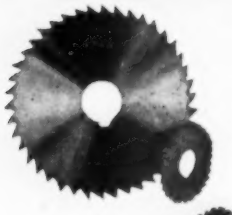
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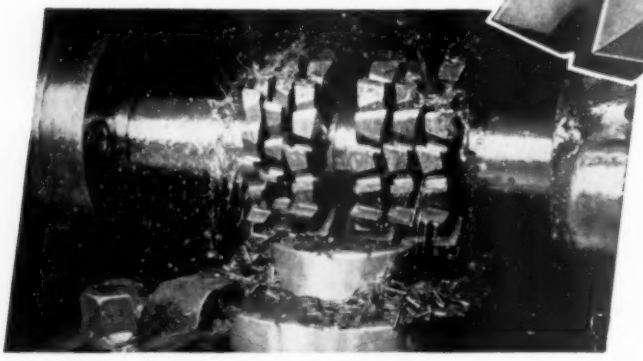
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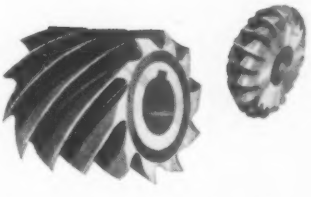




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April, 1949

Vol. XXII, No. 4

Editorial

It is Time to Start the Cure

ONE OF THE foremost topics of today is the economic situation. Declining prices in certain fields, increasing unemployment, high taxes, unpredictable markets at home and abroad, government controls—all these trends of the day are giving business men insomnia as they worry over what to do about this or that under these conditions.

Economic experts are making lengthy reports as to the long range significance of these trends, but they are not in agreement. There are those who play it down as a minor flurry, attributable to normal shiftings and transitions. Others see it as the beginning of a serious recession. And those who stand on a middle ground talk of "mild adjustments" and a "slight recession".

It is natural that this condition gives rise to considerable concern, because no business or industry operates on a day-to-day basis. Long range planning is essential and successful operation is predicted largely on the rightness of this planning. The men who do the planning must try to guess what conditions will be at the time the plan is fulfilled. Therefore, today's uncertainty complicates their work.

However, if an objective, personally disinterested view is taken of today's economic confusion, one is inclined to wonder if it is not just another phase of economic history, seeming more serious and difficult at the moment than it will appear in the overall picture. We hear much about eras of "stable economy", about "normal" economic conditions, but it seems that these terms have a wide variety of definitions and are always applied in retrospect. The situation can be likened to the proverbial statement that a man's greatness is never recognized during his life time.

Since it is impossible to judge the degree of seriousness of the situation at the moment, it seems only reasonable that we should devote our attention to formulation and application of remedial measures rather than spend too much time in diagnosis. This is possible because the most important factor in the cure is one that must be brought into the picture regardless of the degree of illness.

A leading business publication had this in mind when it stated recently, "Spurring of production and employment now looks like the country's most immediate problem."

They were correct in using the words "spurring" and "problem", because increasing production is definitely easier said than done. It represents a need for something more than lip service. The ways and means are available, but first of all it requires a complete faith on the part of the industrial leadership that increased production is the cure. If they so believe, they will then employ all the means at their disposal to bring it about. They will rely on the men who have the "know-how" of mass production, who understand the abilities of men and machines and who are skilled in integrating their work to a point at which it will result in quantity and quality production at a low unit cost.

In describing these men, we have virtually defined the functions of the tool engineer, and that brings the situation very close home indeed. The tool engineers of the country possess the "know-how"; the builders of machine tools and machines can supply the required mechanical factors; American workmen can contribute skilled minds and hands. Thus we have available the three major components of the production formula.

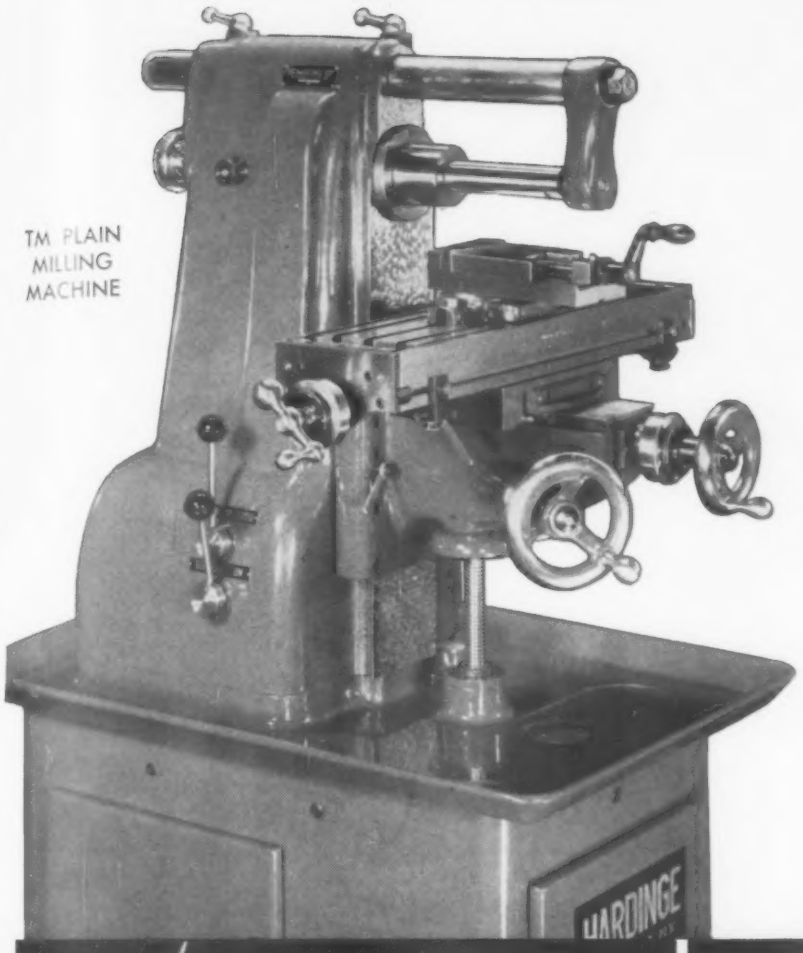
Therefore, it remains for business and industry to spur production and thus increase employment by strongly coordinating the best abilities of these components. The tool engineers will have a dual role to play—their natural part in accordance with their specialized knowledge plus that of salesmen. Their relationship with management and with the other factors in the formula is such that they have both the opportunity and responsibility for convincing them that increased production is indeed the best remedy that can be applied to today's economic maladies.

R. B. Douglas

President 1948-49

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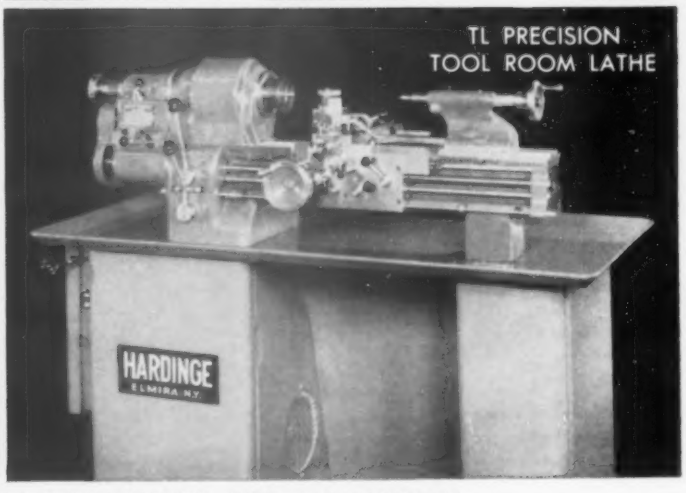
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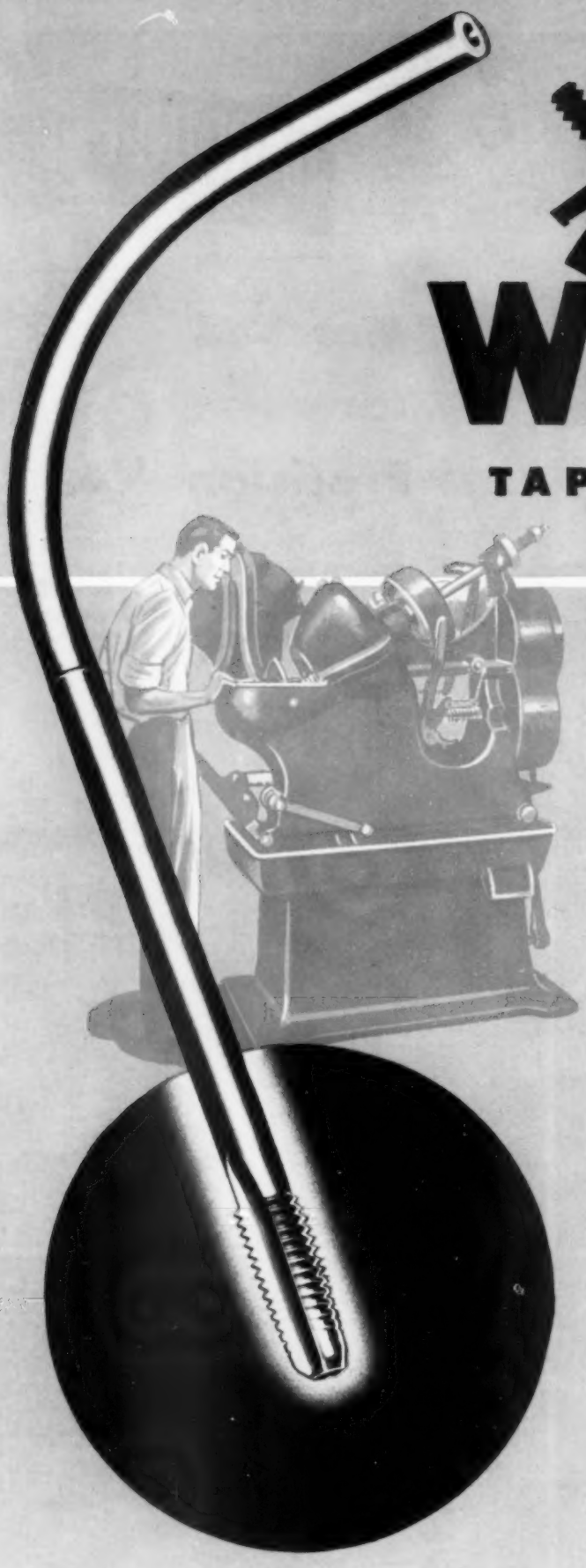
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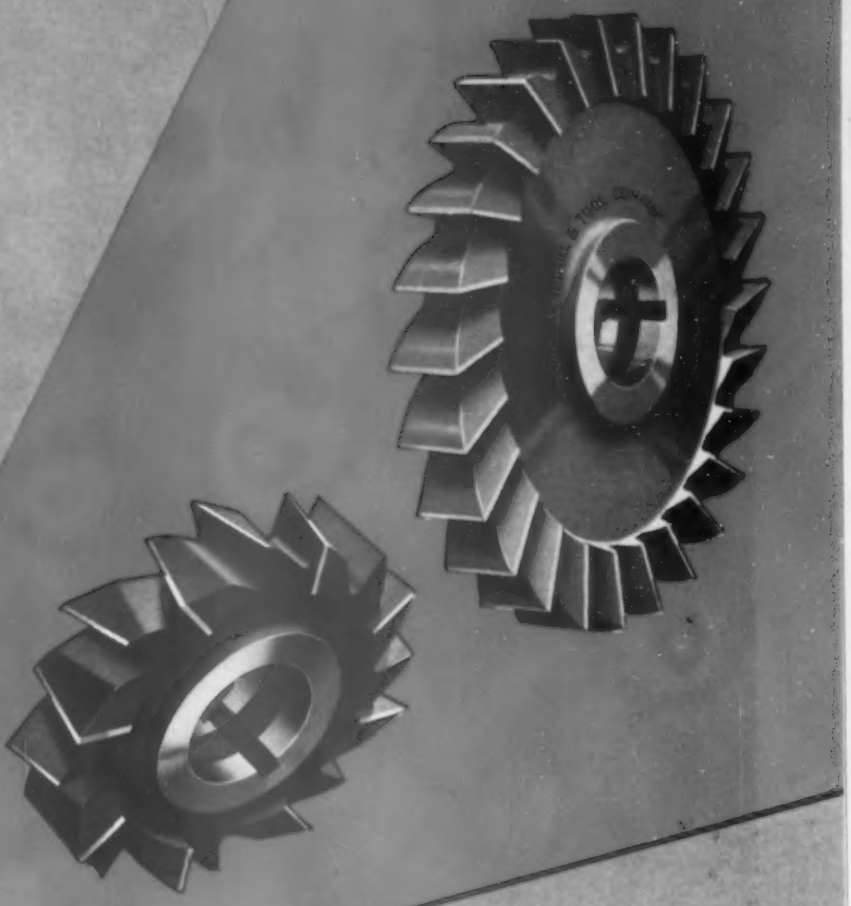
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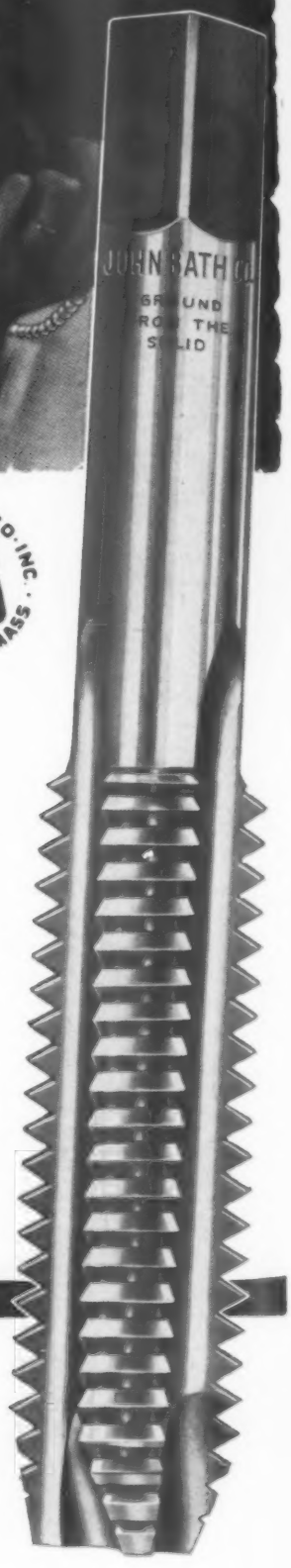
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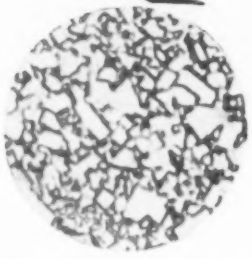
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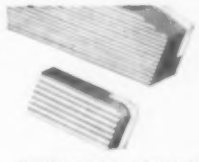

STYLE BL


STYLE C


STYLE FL

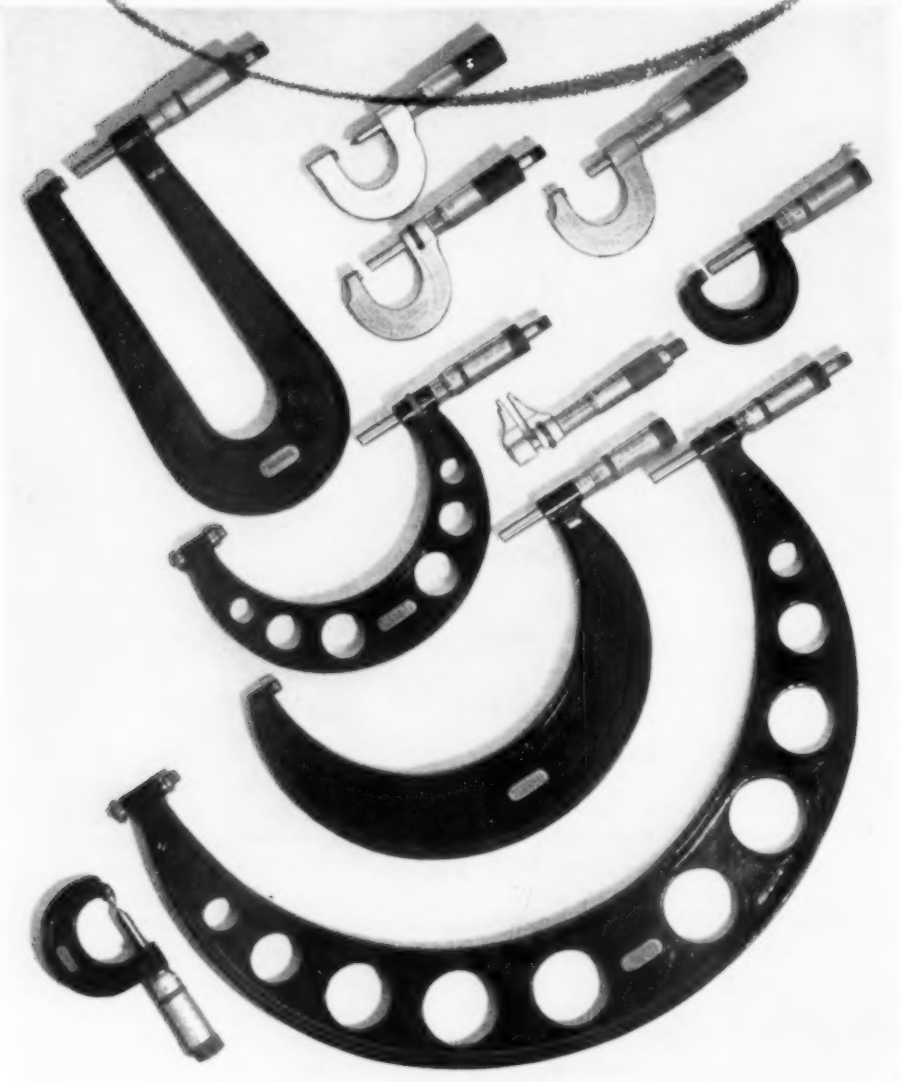

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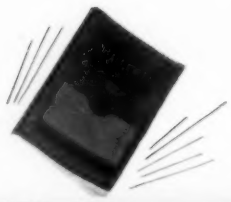
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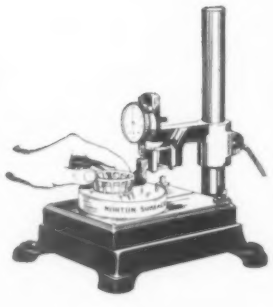
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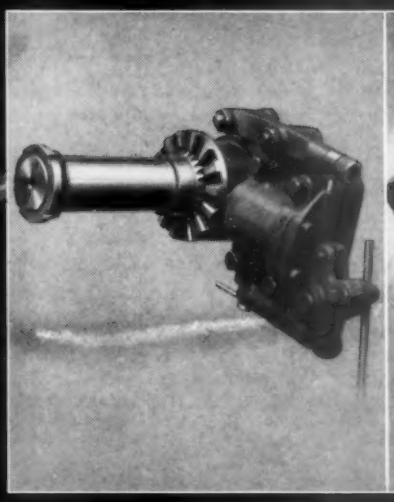


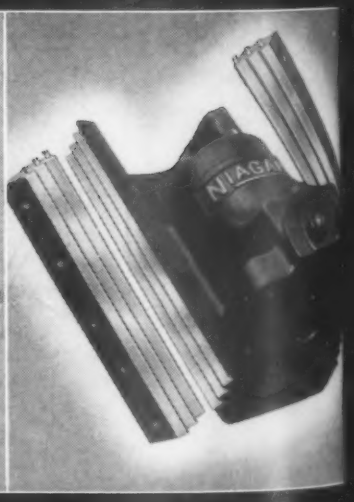
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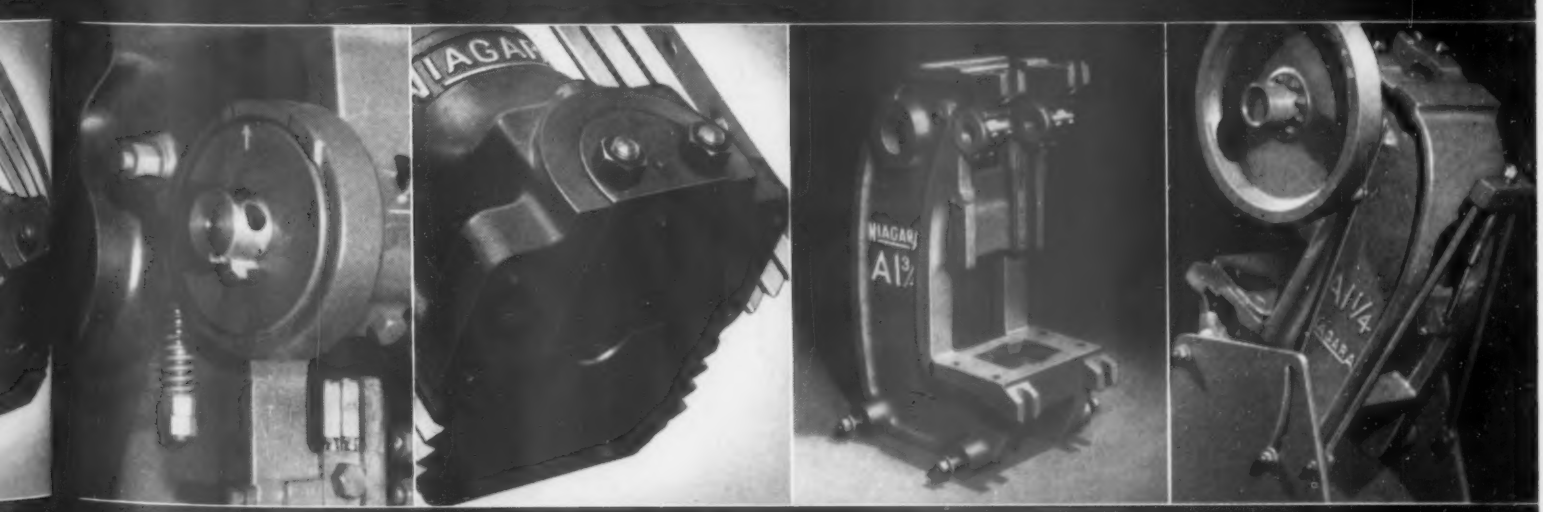
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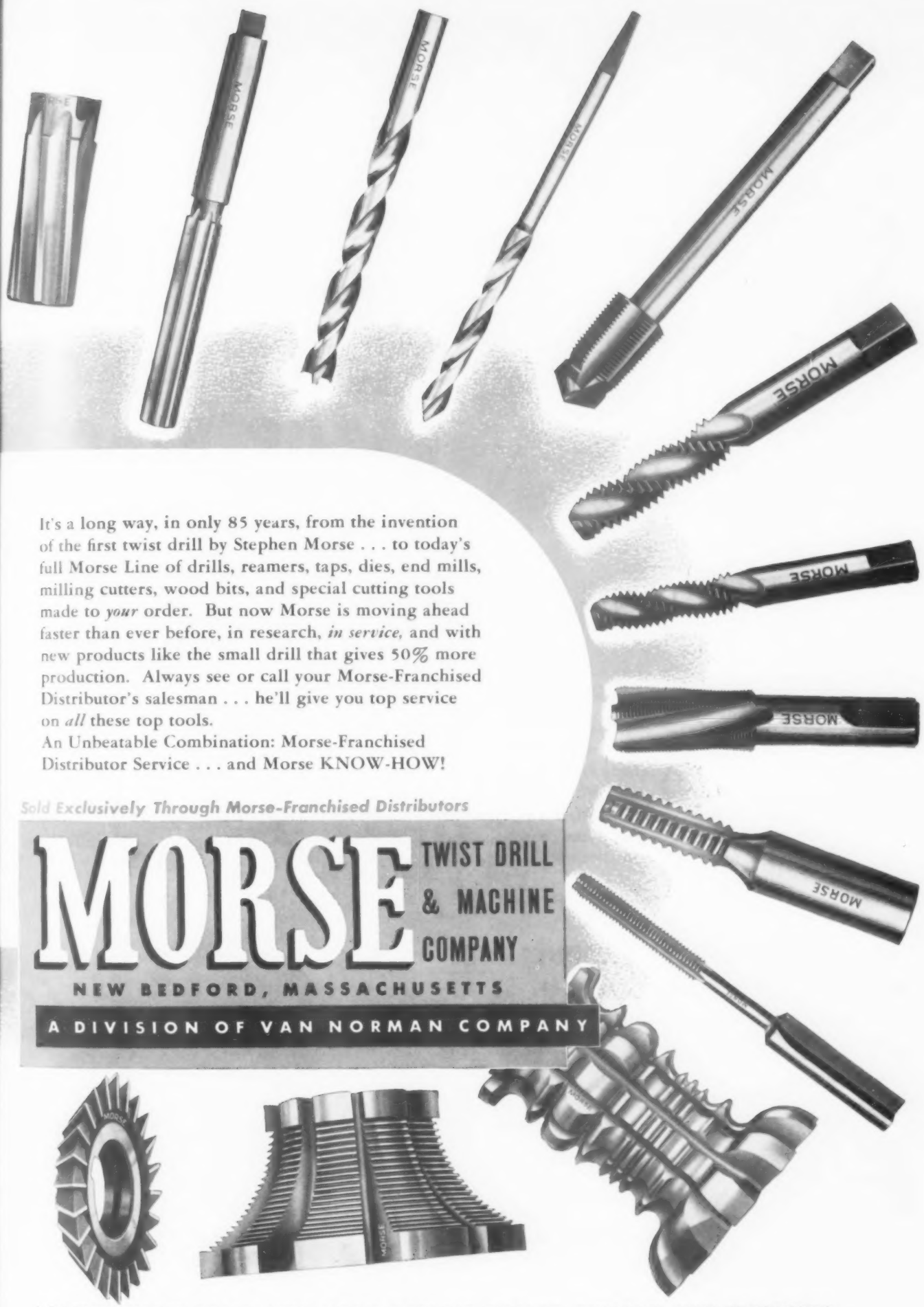
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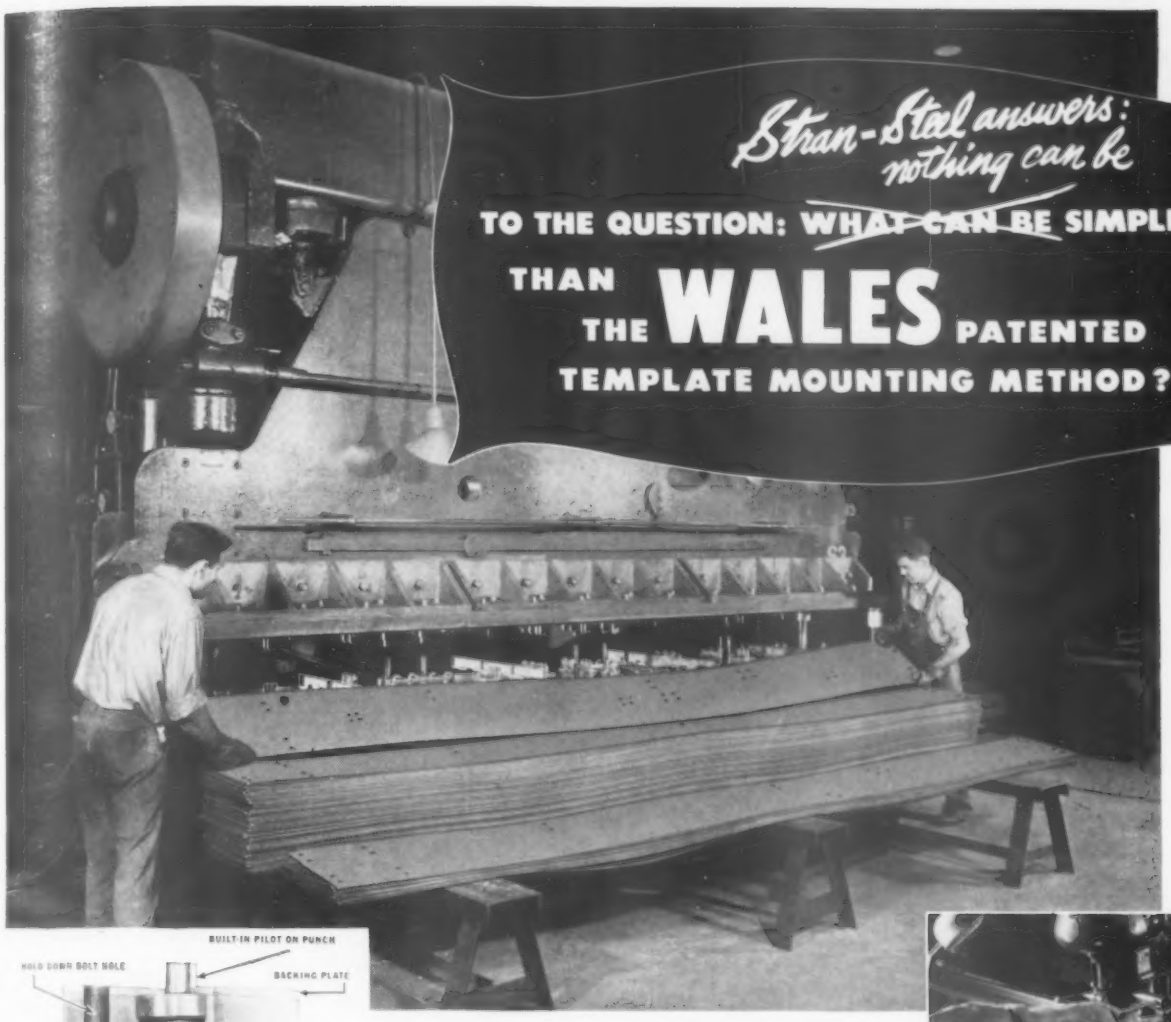
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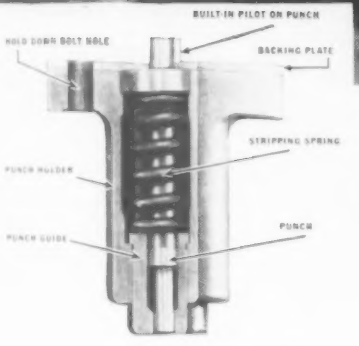


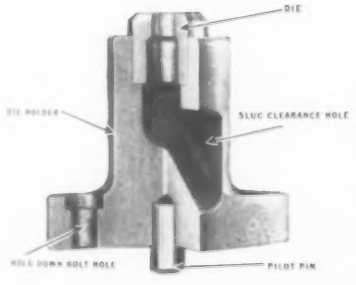
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Stran-Steel answers: nothing can be

TO THE QUESTION: ~~WHAT CAN BE~~ SIMPLER THAN THE WALES PATENTED TEMPLATE MOUNTING METHOD?





Quarter section view of Wales Type "CD" Unit showing relationship of parts of the self-contained punch assembly and die assembly.

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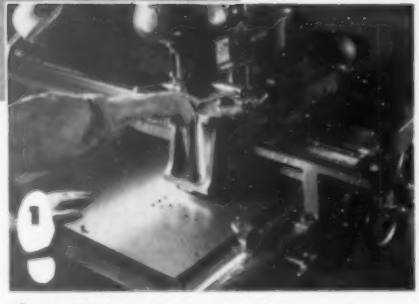
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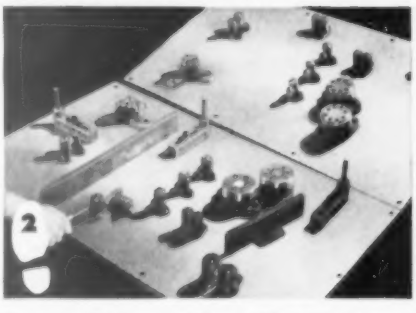
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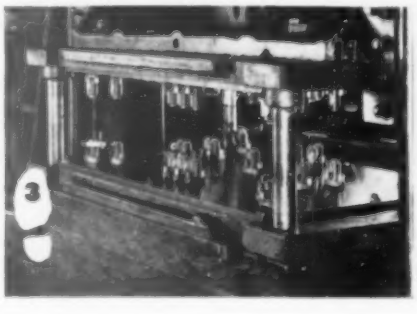


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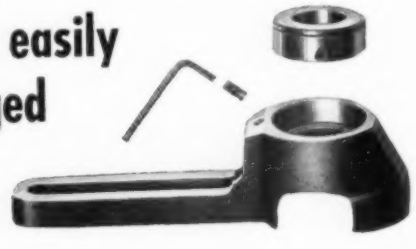
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Westinghouse Reports on Carbide Dies

By Gilbert P. Muir

WESTINGHOUSE ELECTRIC Corporation's Lima plant is approaching a decade of experience with tungsten carbide dies in punch press operation, in a field where 'pioneers' have been experimenting for at most a couple of years. Their experiences are interesting from a number of standpoints, and particularly because they follow the familiar pattern of initial skepticism followed by satisfaction through results.

Design changes during this time have not been radical, but have for the most part followed what is considered good practice with high-speed steel dies. Westinghouse early adopted a tendency toward overbuilding with tungsten carbide dies, principally because of the occasional chipping associated with carbide when not rigidly supported. With regard to thickness it was found more effective to provide a carbide insert of one inch, rather than the ½ inch carbide insert used in the Lima plant's first TC die. In addition to the obvious advantage of longer life, the heavier insert provided greater stability, better cross section and improved shrink-fit. While no galling occurred on the first die, it was decided that the larger insert proved more effective.

Experience here also indicates that in general greater break clearance is possible and advisable with tungsten carbide dies than is true of high speed steel. The TC dies, furthermore, resist pulling slugs with the increased break clearance.

Die grinding and satisfactory cutting edge come in for considerable attention by Westinghouse engineers. Care in grinding is stressed—lapping is recommended as a supplementary finishing operation—to avoid what almost amounts to "burning" the surface.

Fig. 1 illustrates the laminations produced at Lima on tungsten carbide dies. It is interesting to note that the six-station cookie die producing the part shown at left is now being augmented, as an experiment, by a similar six-station die having solid carbide die rings instead of the TC inserts formerly used. The stator die, shown in diagram and photographic form in Fig. 2, and the rotor, shown in Fig. 4, are each members of series on which production records have been kept.

The first stator, designated Serial O, was put into service in 1947 and completed a run-in of 58,500 punchings under a diemaker's control. As shown in Fig. 3, runs of six, seven and eight hundred thousand were made under "control" before the die was turned over to the group. Average production per run to date has been 1,026,000 pieces. Serial 1 die, which was put into production in the summer of 1948, has to date averaged 949,030 punchings per run before

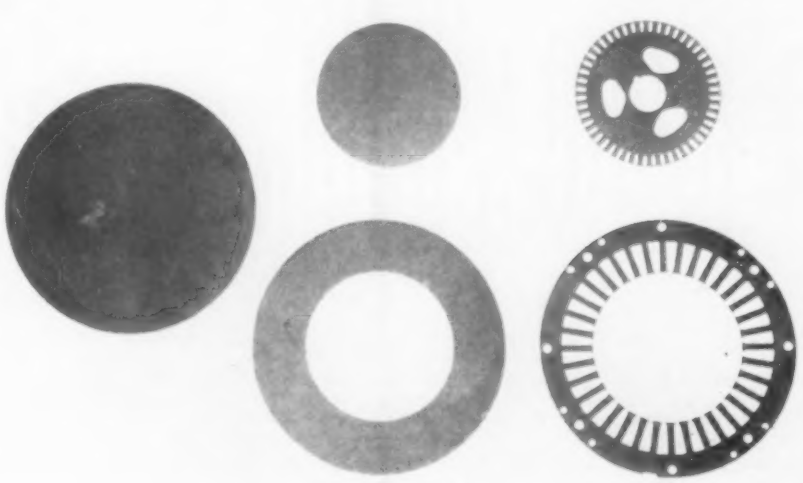
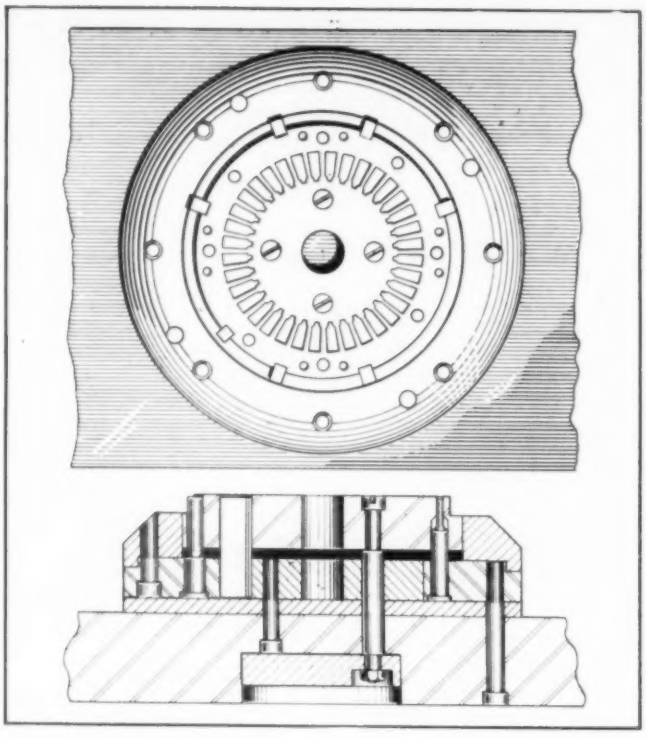


Fig. 1. At right is shown the operations sequence in the production of electric motor laminations. Beginning with the cookie at far left, a separator die produces the two blanks shown at center, which in turn are pierced to form the rotor (top right) and stator (bottom right).



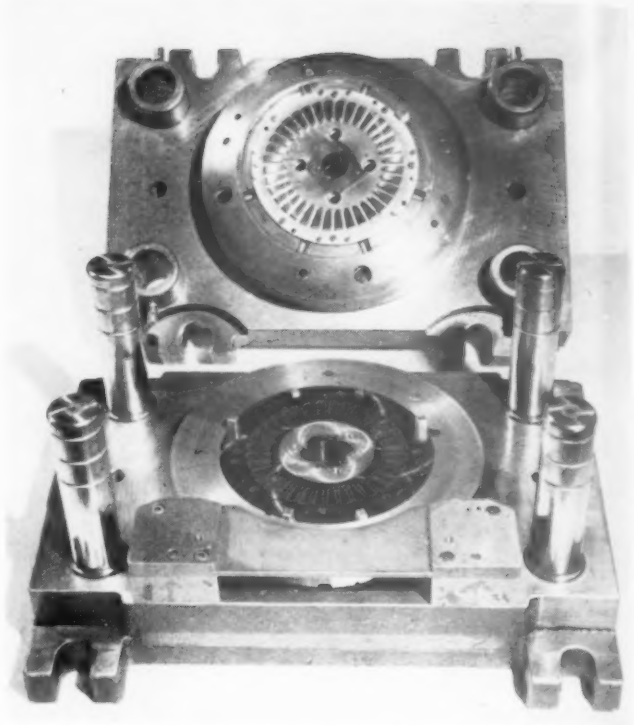
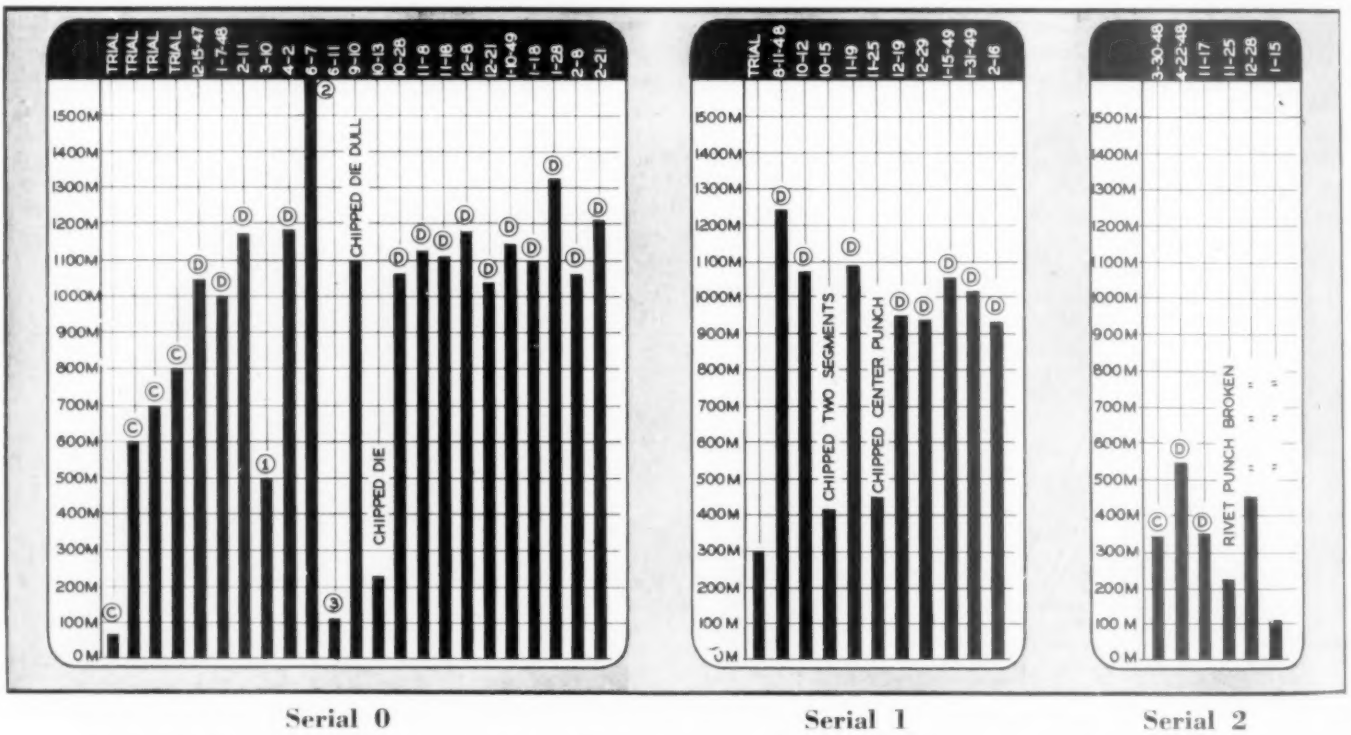


Fig. 2. The full pierce stator die, for which production records are shown below, is presented in diagrammatic form at left, and photographically at right. The first of these dies, inistalled in 1946, has produced over 21,000,000 punchings to date.

grinding. A chipped rivet punch, which was replaced, stopped the first production run of Serial 2 stator die at 561,000 pieces. Stator die No. 3 has an average to date of 660,100 pieces per run, after a few runs due to chipping which cut the average. Serial 4 of the stator dies, the latest, has a total to date of 4,270,000 pieces, with an average run of 1,062,500 per grind.

The rotor die referred to in Fig. 4, being of a somewhat delicate structure due to a .026 wide tang on the punch, presents a naturally weaker die structure and it was with much reluctance that this die was built. It was first set in the press late in the spring of 1948 and ran 323,000 pieces before removal due to a sheared center punch. On the next run a total of 537,900 pieces was made before the die was pulled because of burr. On the third run, due to feeder



Serial 0 **Serial 1** **Serial 2**

Fig. 3. Production records of five series of tungsten carbide stator dies. Serial 0, at left, was set in the press in 1947, and a run-in of 58,500 pieces under a die maker's control was made. The die was checked, and at the same time several runs under control were made using various materials varying in grade and thickness. Runs of six, seven and eight hundred thousand were made before the die was turned over to the group. As shown above, several runs were made by the group before a slug plate shifted, causing the punch to pull slugs, which in turn resulted in two die sections being chipped. Average production to date per run is 1,026,000 pieces.

Note: C—Controlled; D—Dull Die; 1—Chipped two segments of die; slug plate shifted. 2—Two segments broken, two cracked; die not ground. 3—Die dull at 1,666,100 punchings.

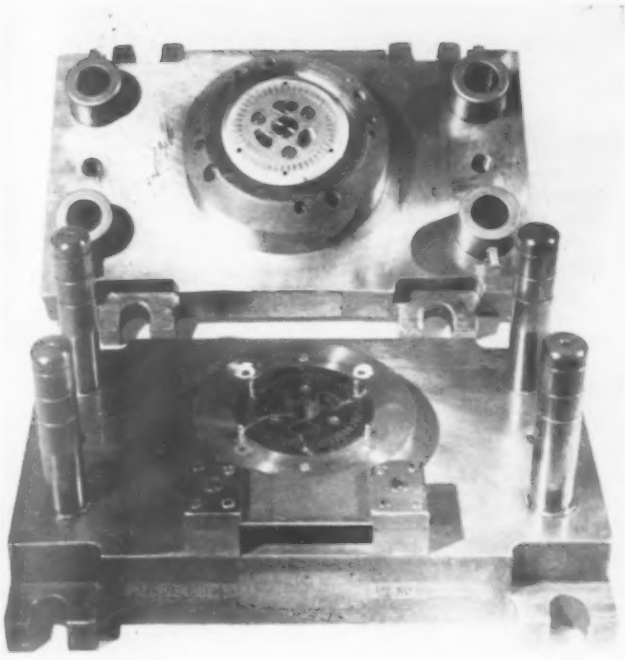


Fig. 4. Above is the tungsten carbide rotor die, installed at Lima in the Spring of 1948. This photograph, and Fig. 2 both present a good view of the improved stripper design set on the die.

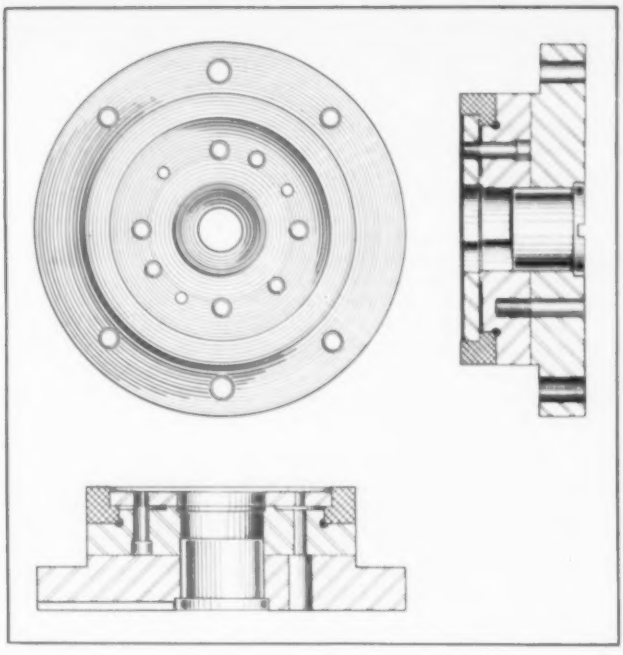
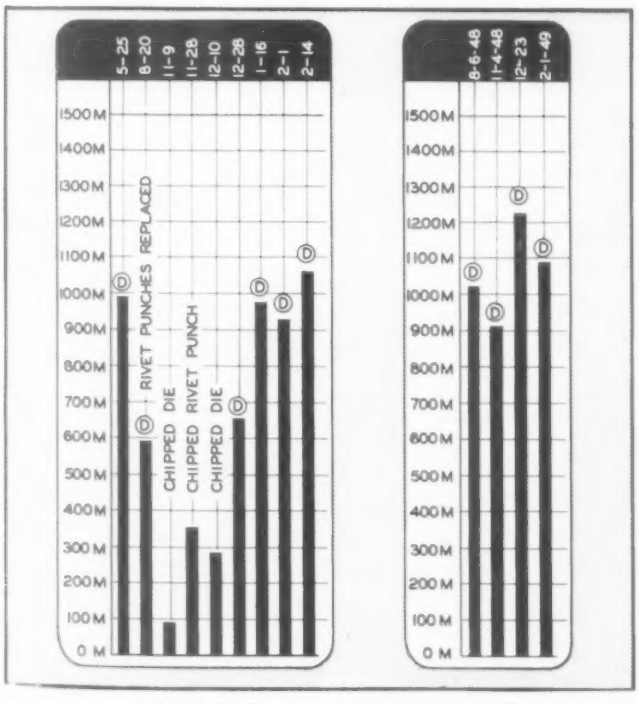


Fig. 5. Above is the cookie die used at Lima, presented in diagrammatic form. Until recently this die utilized a tungsten carbide insert with steel backing; the latest on order will have solid tungsten carbide die rings.

mechanism difficulties, six punchings entered into the die at the same time and at this stage, after running 62,000 pieces, the breakage of two punches and two segments occurred.

One of the latest dies installed at Lima is a six-ring tungsten carbide cookie die, set in one of the cookie presses, during November of last year. To the middle of February, 1949, it had produced approximately 3,777,000 cookies when a key on one side of the press worked loose, causing one side of the punch assembly to enter before the other. Two punches were sheared in the process, but other punches remained in good condition. Construction of the cookie die is shown diagrammatically in Fig. 5.

As mentioned earlier, early experience at the Lima plant indicated that tungsten carbide punches were successful under adverse circumstances so long as provision were made for sufficient rigidity. This is particularly true in guiding



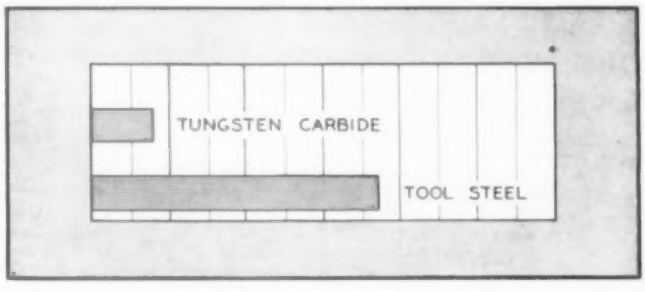
Serial 3 **Serial 4**

Serial 1 stator, center, is one of the most recent. Average production per run has been 949,030 pieces.

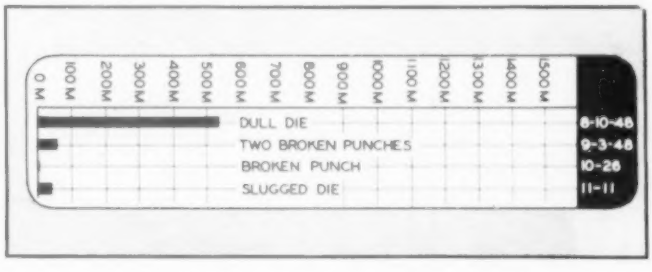
Serial 2 stator, left, had its first run-in of 343,000 pieces in March, 1948, at which time it was given a complete check and was then turned over to the group. At the same time a rivet punch was replaced due to chipping—it was felt that complete replacement was more feasible than grinding to a point beyond the chipped section.

Serial 3 stator, right, totalled 400,000 pieces on the first run-in in May, 1948. As shown in the chart, production was held down somewhat due to chipped sections. Average run to date has been 660,100 pieces before regrinding.

Serial 4 stator die, at left, has averaged approximately 1,065,000 pieces for each of the four runs to date.



Comparative burr height for tungsten carbide and tool steel is shown in the chart above. Relative height is based on a run of 180,000 pieces on electrical grade silicon steel strip; material was hot rolled, pickled, annealed in reducing atmosphere.



Production record of Series 1 rotor die is shown in the chart above. Previous to this, a sheared center punch on May 30, 1948, stopped the run at 323,000 pieces. The die was set again on June 30, and ran 40,465 pieces before a punch was broken—caused, it is believed, by excessively hard material.

TABLE I—ECONOMICS AND PRODUCTION OF A STATOR FULL PIERCE DIE

	Steel	Carbide
Initial cost (Dollar ratio) . .	$ 1	$ 3
Total die runs per die (1 in. thick)	100	100
Grind time allowed (hr. units)	1	2
Extra maintenance time (every 2nd regrind—steel every 3rd regrind—T.C.)	1.0 hr.	9.0 hr.
Total hours for maintenance (overall die life) . .	250 hr.	1209 hr.
Total pieces per die life . . .	4,500,000	100,000,000
Repair hours per piece	.000056	.000012
Maintenance cost of die life	$ 392.50	$ 1898.13
Cost of die per piece	$ .000865	$ .000129

Savings per punching $ .000736 per die
Savings per punching .001472 per set (stator & rotor)
Savings per motor $ .1045

One set of dies (one rotor and one stator) is paid for in 3½ months by savings.

the punch, as the presence of pressure in a plane perpendicular to punch travel is a heavy contributing factor in punch breakage or chipping. To increase rigidity and reduce chipping, Westinghouse has for some time employed a redesigned stripper for tungsten carbide dies, as shown at left in Fig. 6. As can be noted from the diagram, the earlier stripper, shown at the right was of more or less open design, and did not provide sufficient mass against vibration and stress at the point where it was needed the most—at the end of the punch. A photo of the old stripper is shown at left, and the new stripper at right, of Fig. 6a. In addition to providing greater support, the heavy support ring shown in the diagram is an effective dampener against vibration.

TABLE II—SUMMARY OF MAINTENANCE TIME ON STEEL AND CARBIDE DIES

	Per Month (Stator & Rotor) Steel (H.S.S.)	T.C.
Hours, for regrind	416	86
Hours, for extra maint.	104	28
Hours, for die sets	208	10
Die setters	4	2
No. of dies used—each*	1.04	0.05

*Number of dies required for given production, which is reflective of productivity per die.

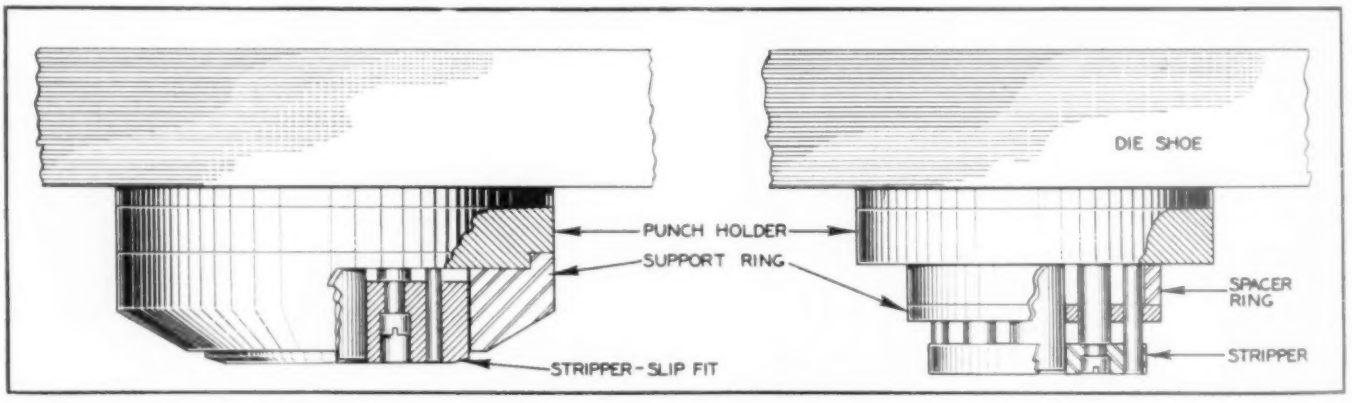
Economics of Carbide Dies

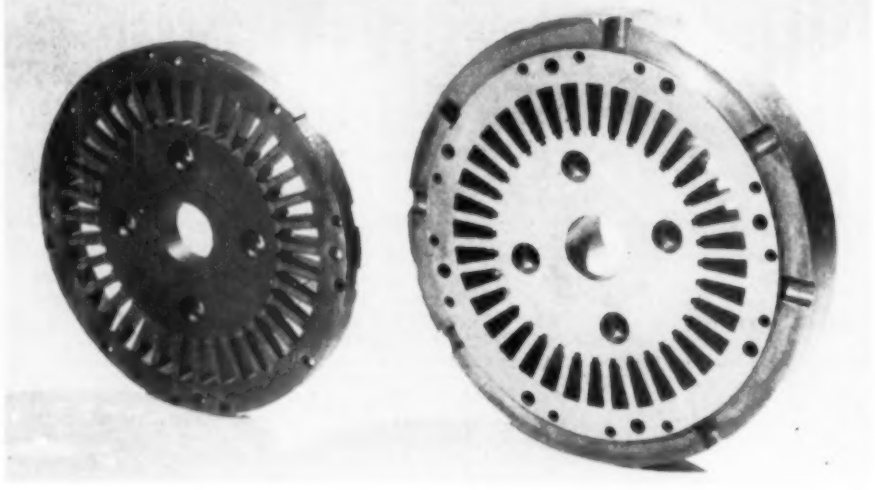
For the Lima plant production a very large quantity of punchings are required per month. Naturally a small savings per punching is considerable when using tungsten carbide dies for volume production.

Data showing comparative costs of tungsten carbide and high speed steel stator full-pierce dies are shown in Table I. Some additional background information might be of interest.

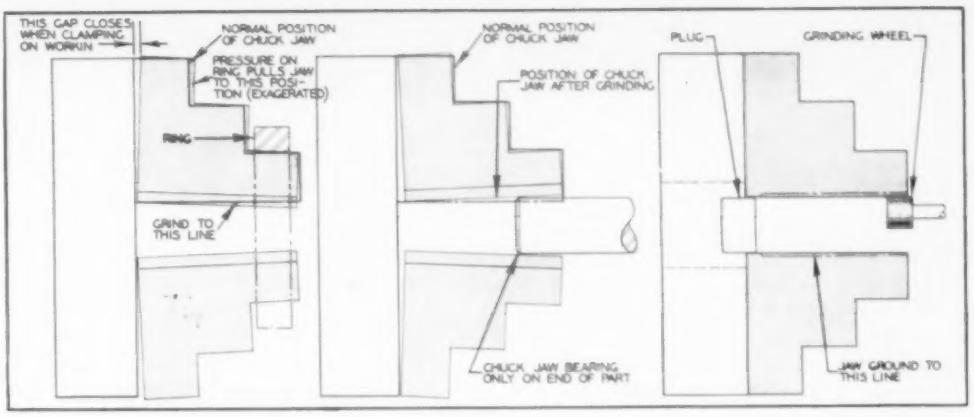
In terms of die grinds per month for the stator die, 104.1 grinds are required on an average for steel dies, and 4.7 grinds per month for the TC dies. Maintenance for the steel dies averages 260 hours, and about 57 hours for carbide dies.

Table II presents further monthly figures for steel and carbide die sets (stator and rotor). One significant comparison is the number of hours spent per month on die setting. Average down-time per press due to die change is one hour, and as seen from Table II total down-time due to die change amounts to 208 hours for steel dies as against 10 hours for TC dies. Therefore total production time amounts to 2440 hours for steel dies, whereas with carbide dies 2242 hours are required for the load—a saving of 198 productive hours per month.





The improved Westinghouse stripper design is shown in Fig. 6, above, in cutaway form. Note that the former design, at right, lacks the rigidity and support afforded by the newer design at left. The heavy bull ring surrounding the stripper in the improved model adds to the success of the unit. Fig. 6a, right, presents photographically a comparison of the two strippers. The bull ring is well illustrated in the improved stripper at right.



Shown in Fig. 1 (left) is an exaggerated view of the out-of-normal position of the chuck jaw due to pressure on the ring. Fig. 2, center, shows the result in that the jaws are out of parallel with the lathe axis, causing runout of the work. This is a result of the incorrect grinding in Fig. 1. Fig. 3 illustrates a better method of achieving accuracy—use of a plug in the back end of the chuck. This proves more accurate, but the process is slow.

Regrinding of Jaws for Self Centering Chucks

By J. R. Paquin

HOELSCH ENGINEERING CO., INC.

A COMMON PRACTICE in regrinding worn chuck jaws is to expand them against a steel ring; then, while the chuck is rotating, to grind the inner faces with a toolpost grinder mounted on the lathe cross slide. This practice has not proved entirely satisfactory, for in many cases when the ring is removed after grinding and a piece of stock held in the chuck for machining; run-out of the work is not completely eliminated.

The main reason for this inaccuracy is that back-lash in the jaws is taken up in the direction opposite to that when pressure is later applied on the work-piece. The teeth at the back of the jaw bear on the side of the scroll which has negligible wear, rather than on the pressure side, where most wear has occurred, and which later will act as a stop when pressure is applied.

Axial play of the jaws is also taken up in reverse direction to that when the chuck is operating, as shown exaggerated in Fig. 1. The result, Fig. 2, is that when the jaws are under reverse pressure in holding work, they are thrown out of parallel with the lathe axis; with a consequent run-out of the part.

A better method for achieving accuracy is illustrated in Fig. 3. Here, a plug is held in the back end of the chuck as shown, with only about ⅛ in. of the jaw face bearing on the outer surface of the plug. The grinding wheel is fed in, truing up the jaw faces, then stopped axially as close as possible to the plug face. When the bearing surfaces of the jaws have cleaned up, the plug is removed and the back portion of the jaws, which was not ground, is relieved either by grinding in the lathe or by hand.

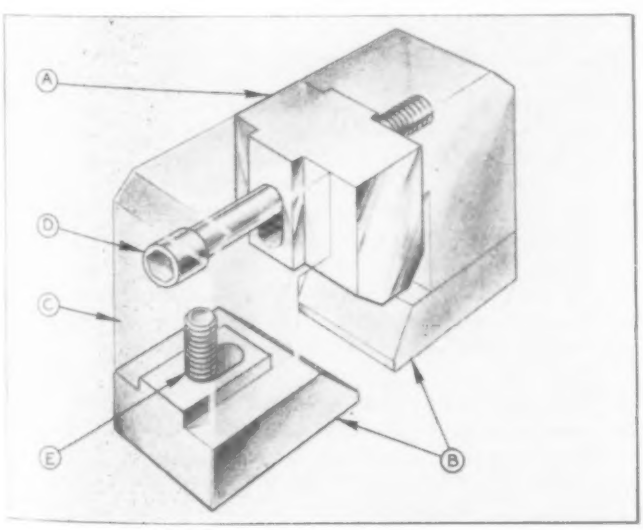
However, this is a slow and tedious process. There is always the danger of the wheel hitting the plug too hard and fracturing. Also, since the pressure is at the back of the jaws, axial play is not completely eliminated in the desired direction.

Fig. 4 illustrates the tool designed to overcome these limitations. Essentially, it consists of a set of three units which fasten to the regular jaws of the chuck. These act in the manner of false jaws, and do the actual clamping on the ring, as shown in Fig. 5. Thus, all back-lash and axial play is eliminated; much as if the chuck were actually bearing on the surface of a part to be machined.

The tool consists of the adjustable jaw *A*, (Fig. 1) the adjustable members, *B;* and the grooved blocks, *C*, into which parts *A* and *B* fit. These are fastened together by the socket cap screws *D* and *E*.

As seen in dotted lines, elongated slots permit adjustment of both the jaw *A*, and lower members *B* to accomodate the size of chuck jaw being trued up.

If the range of sizes of chuck jaws used in the shop is not too great, the tool, being fully adjustable, can be made to take care of all lathes. Kept in the tool crib, it can be quickly set up when needed.



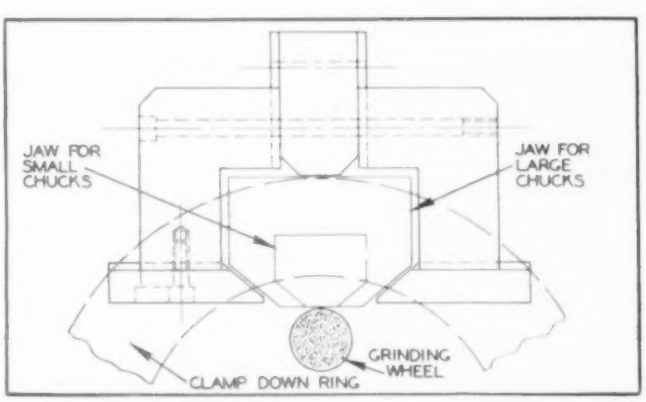


Fig. 4 (above) shows the tool designed to overcome the limitations of regrinding chuck jaws. At left, Fig. 5 illustrates an assembled view of the tool, which consists of adjustable jaw A and members B, together with the grooved blocks C into which A and B fit. Socket cap screws C and D fasten the assembly.

Chemical Surface Treatments for Metals

By A. E. Durkin

GENERAL ELECTRIC CO.

THE SELECTION OF suitable finishes for steel, magnesium and aluminum involve a number of important considerations, such as corrosion resistance, processing time, and the type of equipment to be used—all of which must be weighed before finally selecting and installing a process.

Cleaning is the first of these considerations, since successful finishing depends to a great extent upon proper preparation. Cleaning generally may be divided into three major types: emulsion, alkaline and vapor degreasing.

Emulsion cleaners for the most part consist of an emulsifying agent dissolved in a petroleum thinner or solvent and are generally used in conjunction with alkaline cleaners. The part being processed is immersed in this solution for periods ranging from 30-60 seconds, depending on the application, then followed by dipping the part in hot water to break the emulsion. The part is then normally processed in an alkaline cleaner. The function of the emulsion is to wet the foreign matter present so that the bulk is removed and the subsequent cleaner load is lightened. For example, with buffed aluminum we have found that some parts, because of surface conditions and the time that had elapsed between buffing and cleaning, would not clean up in immersion periods up to ½ hour in a good inhibited alkaline cleaner. However, the parts were cleaned thoroughly when a 60 second predip in a suitable emulsion cleaner was followed by a 3 minute dip in the same cleaner. It might be interesting to note that the emulsion cleaner alone removed 60 percent of the foreign matter in a 30 second dip and approximately 95 percent in a 60 second dip. This was determined by incorporating a fluorescent dye in the buffing compound and inspecting the part under ultra violet light after each operation.

In our opinion, emulsion cleaners should be used in all processes wherein the parts to be cleaned contain heavy oils or buffing compounds. They likewise should be used in all small setups wherein the load on the alkaline cleaner is great or where more than ordinary control of the cleaner is found to be necessary.

The equipment used in setting up an emulsion is inexpensive and consists of an ordinary tank equipped with a safety cover to reduce fire hazards. The tank should also have a suitable sludge remover at the bottom to insure proper maintenance. As this type of cleaner is difficult to rinse, the rinse tank following it should be hot and should be equipped with air agitation or with a pressure rinse device. The control of the emulsion is simple in that when the emulsion does not break in the rinse tank, more concentrate is added to the solvent. When it becomes economically unfeasible to control the tank, it is discarded.

Alkaline Cleaning

The second type of cleaning is classified as alkaline cleaning, which consists of immersing the part in a cleaner for a prescribed time to remove foreign matter. The functions of this type cleaner are mainly wetting, with some emulsification and saponification.

Alkali cleaners are best used on light oil applications or in conjunction with emulsion type cleaners. These cleaners may also be inhibited so that they may be used safely on aluminum.

The equipment used in alkaline cleaning consists of a suitable tank equipped with a closed coil or any heating arrangement wherein the concentration of the cleaner will not be affected as it would if live steam were inserted in the tank using an open steam coil. Air agitation should be supplied for more effective cleaning.

Most important in cleaning is the rinse tank following the cleaning operation. By using a weir type rinse tank, the danger of contaminating the work more in the rinsing operation than was had on the uncleaned part is eliminated.

Fig. 1 shows a top view of a poorly designed and a well designed rinse tank. The tank on the left is inadequate and allows for contamination of the work as it is withdrawn from the rinse tank. The XX areas shown designate stagnant grease areas. In the weir type tank on the right no such areas are noted except at the overflow. This pictures an actual shop condition before and after tank redesign. Note the horizontal water inlet at the bottom of the right hand tank. This type inlet, if properly located, guarantees good flow and therefore a clean rinse tank at all times.

Fig. 2 shows a weir type rinse tank with the make up air duct removed. One interesting construction feature of the duct is that the air which blows through it and across the tank is reclaimed from the exhaust system of the preheat water and seal tanks in the adjacent chromic acid anodyzing system.

In cleaning and processing, adequate temperature controls for good work must be had. Where temperature indication is needed at the particular tank, the installation should be supplemented with indicating instruments. These instruments are checked a minimum of once every three months to insure their accuracy.

Vapor Degreasing

The third type of cleaning is vapor degreasing. It is used wherever parts are such that they are not brought up to heat too quickly thus preventing the chlorinated solvents, which are used in this type cleaning, from condensing on the part. As long as solvent is condensing on it, the part is being cleaned. Thus, it may be impossible to clean a light oil from a light piece if that piece comes up to temperature too quickly. A heavy part with heavy grease would clean up in a shorter period. This type cleaning has the advantages of fast cleaning—aluminum and similar metals can be

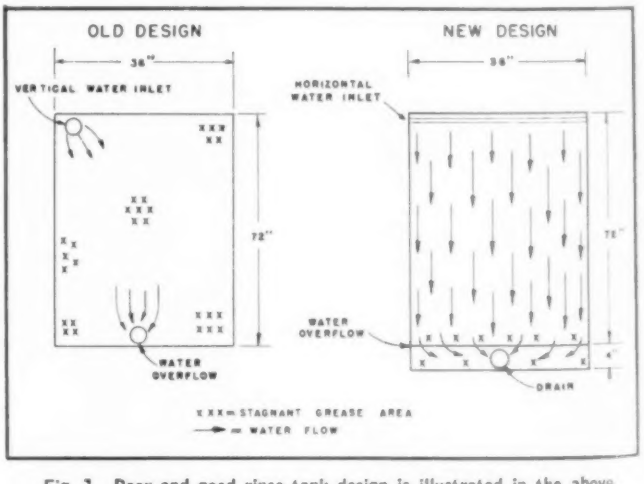


Fig. 1. Poor and good rinse tank design is illustrated in the above sketches. The poor design at left permits contamination of the work as it is lifted from the tank, while at right circulation is improved and contamination reduced.

Presented before a meeting of Boston chapter, ASTE.



Fig. 2. Shown above is a weir rinse tank with the makeup air duct removed. Components shown are weir extension (1), weir overflow drain (2), steam control valve (3), water control valve (4), and makeup air duct (5).

cleaned; low cost, if designed and properly maintained and parts being processed do not have too much dragout.

The equipment used in this type of cleaning is standard and consists of a chamber in which the solvent is heated. The part being cleaned is immersed in the liquid or vapor stage or both, depending upon the work and the type of degreaser in use. In selecting a degreaser, one with the smallest possible surface is the most desirable. This may involve inserting the part in sideways. In the long run, however, such a degreaser will be easy to control and will be most economical in operation. It has been estimated that 1/20 of a pound of solvent is lost per hour for each square foot of surface area at the operating temperature of the degreaser.

Rust and Scale Removers

Once the part is cleaned, the removal of rust and scale must be considered. Cleaners or solvents remove grease and grease only. Rust or scale is removed by acid pickling or descaling. A misunderstanding in acid pickling is in the supposition that it removes grease. Acid does not directly remove grease.

Generally, low carbon steels are pickled in hydrochloric or sulphuric acids. While hydrochloric acid may be more expensive initially than sulphuric acid, it may be cheaper in the long run, particularly in some operations as welding. Many times the smut produced using the latter acid is objectionable. In extremely critical operations such parts may rust rapidly unless they are completely neutralized, which is difficult. In normal pickling cycles using hydrochloric acid, the parts are free of excessive smut and can be more readily neutralized with less possible danger of immediate rusting than parts pickled in the former acid.

In the case of stainless steels, the use of descaling processes is supplanting the use of acid and acid type descalers. The former generally consists of molten type baths which are heated to approximately 800-1000 deg F. The part is immersed in this type bath for a prescribed time, quenched in water, and pickled for very short times up to 1 to 3 minutes in one or a combination of acids.

Among the molten baths on the market today are the DuPont sodium hydride process, the Kolene process, the Virgo process, and molten caustic soda.

All of these processes have virtues and should be considered where the descaling of stainless steel is a problem.

Fig. 3 shows a molten bath installation in our shop. This is an electrically heated tank having a charge of approximately 8 tons of salt. The blank part shown is ready to be immersed in the 800 deg bath for a 20 minute period. After processing, it is quenched, then acid treated for 3 minutes in a combination of acids to remove the loosened scale.

Shown in Fig. 4 is a comparison of a type 347 stainless steel ring descaled in an acid type pickle bath with that obtained in the molten process. Note the complete removal of all oxide on the ring at right. To remove the oxide on the ring at left would involve prohibitive acid pickle times or exceptionally strong acid solutions.

Molten baths have disadvantages in that equipment is costly and many times, because of the heat involved, cannot be used on thin fabricated parts. They prove their great advantage in that they eliminate the danger of intergranular corrosion commonly had in the descaling of stainless steels with acid type pickles.

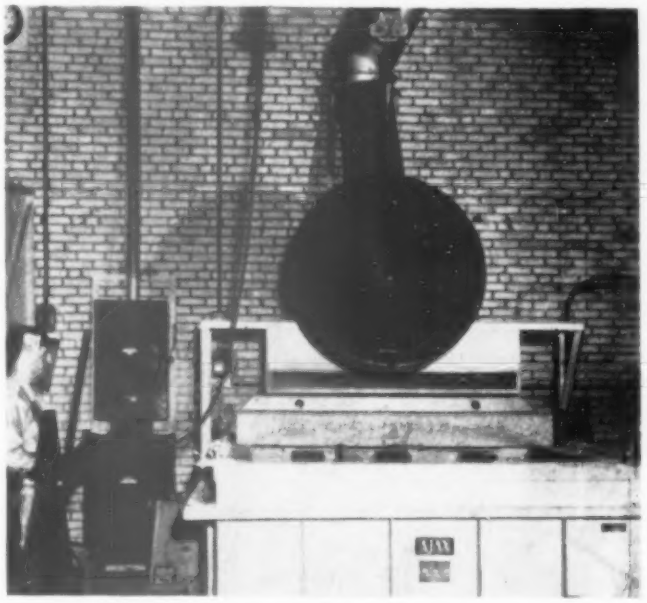


Fig. 3. This molten bath installation, electrically heated, has a capacity of eight tons of salt. The blank shown will be immersed for 20 minutes at 800 deg F.



Fig. 4. The type 347 stainless steel ring at left was descaled in an acid type pickle bath, while the ring at right was treated in molten salt bath. Composition is the same, but time required to give ring at left a comparable finish would be prohibitive.



Fig. 5. The specimens shown above, all black oxide treated, indicate the relative corrosion resistance of further applications of oil.

Black Oxide Treatments of Steel

Black oxide treatments were used on common steels during the war period to a great extent. This type of coating afforded some degree of protection to parts without the use of expensive plating or painting procedures.

One of the most common uses of black oxides today is found in the arms industry, where parts were formerly heat treated in an organic medium for many hours to obtain a finish which offered the gun some protection when properly lubricated. This long process has been replaced, to some extent, by shorter caustic type bath treatments which give a black coating to such parts equal if not superior in corrosion resistance to that obtained in the old process.

The black oxide coatings have little corrosion resistance in themselves, but convert the surface of the processed part to a microscopically porous iron oxide surface, which traps lubricant and offers some corrosion protection. This resultant film is approximately 0.00004-0.00001 in. in depth. The surface is usually produced in baths operated at 300 deg F with processing times between 10-30 minutes. Black oxide baths are available under many trade names, including DuLite, Houghto Black, Jetal, Pentrate, Ebanol and many others.

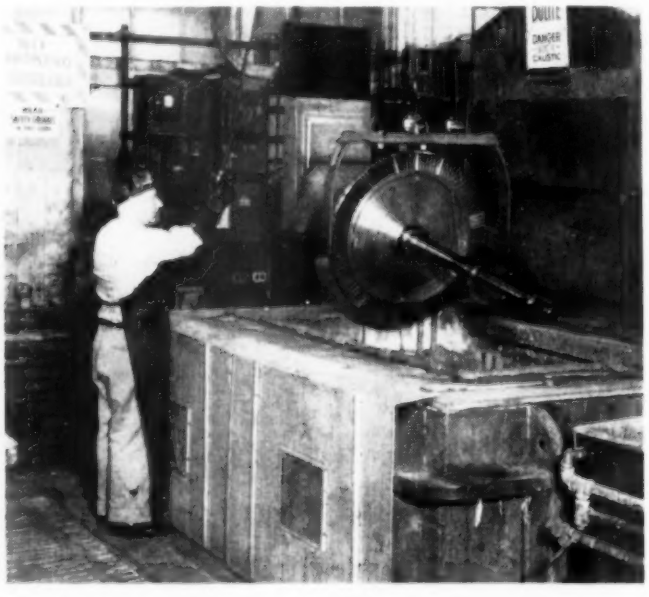


Fig. 6. Equipment for black oxide treatment is seen in this view of a part about to be reprocessed. Note automatic control instruments on wall in background.

Fig. 5 shows the salt spray resistance of a black oxide treated specimen after only 30 hours on test. It is obvious that not too much protection is offered by the black oxide unless it is lubricated. The final resistance as shown depends on the type of lubricant used. The sample on the extreme left is untreated and untested and is included for comparative purposes. Note that the unoiled oxide coating is superior to the unprocessed sample, the sample covered with the light oil is superior to the one that was not oiled, and the extreme right sample treated with a heavy oil is unaffected by the test. It is estimated that this last sample would withstand 80 to 100 hours before a breakdown.

Because of the porosity of this type coating and its trapping quality, it is used on parts where metal contact is not desired. It is used chiefly on pistons, gears and similar parts.

Shown in Fig. 6 is a repair part about to be processed in horizontal position in the black oxide tank. The equipment for such a large tank is costly as may be seen. The automatic instruments shown on the wall control the automatic water supply, the temperature of the salts, and the temperatures of the furnace. The device shown on the left of the tank is a leveller which prevents the automatic water adding system from overflowing the tank. Because of the size of the parts processed, they are given a mist spray while over the oxide tank to prevent staining of the blackened surfaces. If the part is not rinsed within approximately 15 seconds after blackening, staining results. The shield in front of the tank is swung upward during this spray mist for protection.

For parts where the salts can be trapped, immersion rinse tanks are not adequate, and pressure rinses must be used.

Some manufacturers of black oxide salts recommend the use of boiler plate in the construction of the heating tank. We have found this to be true only when excessive solution drag out is had. Where little or no drag out is had a red oxide builds up in the tank, which affects the quality and appearance of the part being processed. With no drag out, we have found that a stainless steel tank is a requisite.

Phosphate Coatings

Phosphate coatings were also widely used during the war period and are used today in the automotive industry. This type coating, depending upon the solution used, is a base for paint as well as an oil absorbing coating which prevents scoring, galling and metal to metal contact, the same as black oxides. The solutions from which these coatings are

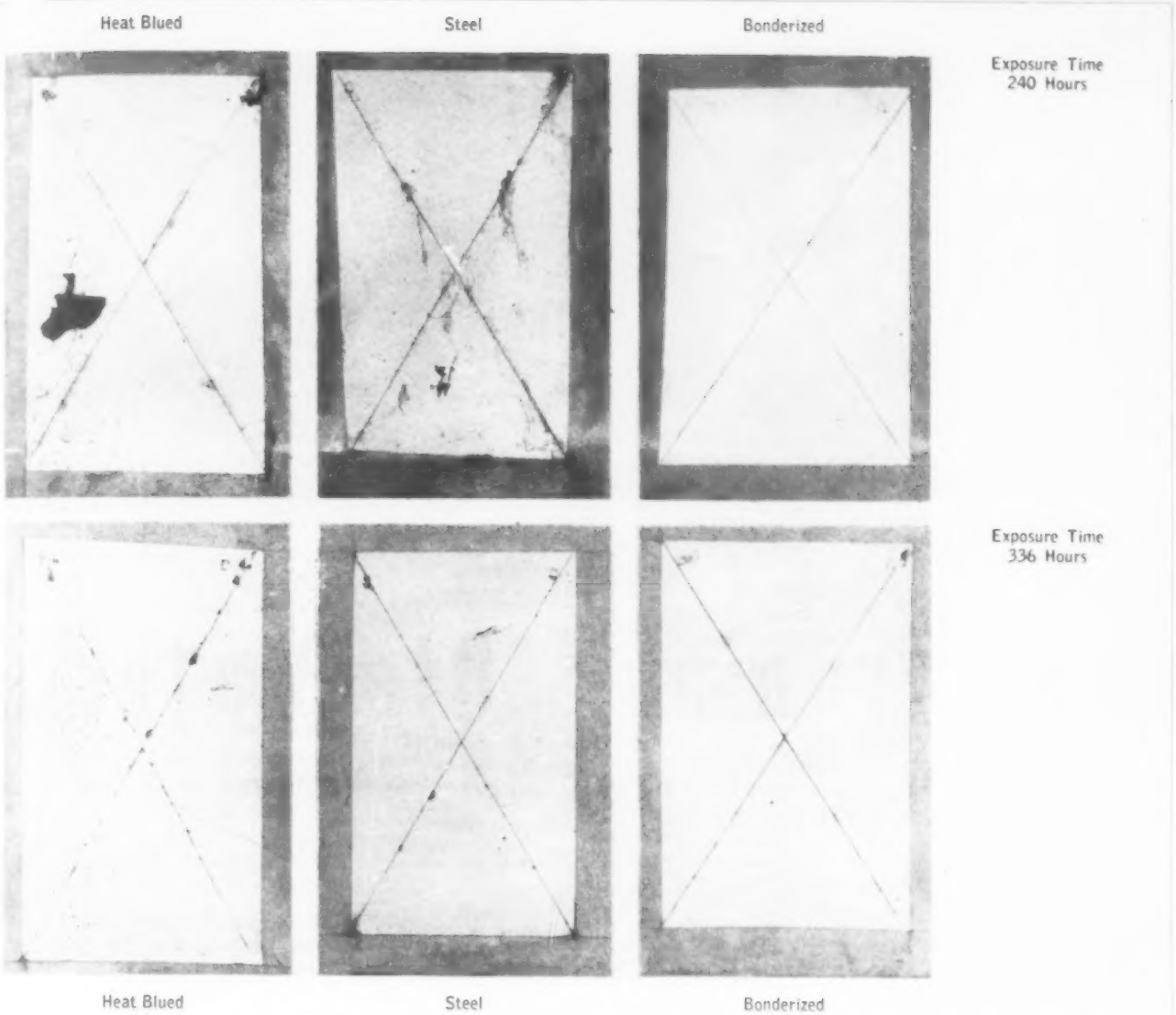


Fig. 7. The advantages of a phosphate coating over ordinary heat treatment as a base for painting is illustrated in the panels shown above. Treatment for the top panels involved salt spray exposure (20 percent) at 95 deg F, while the panels at bottom were subjected to a relative humidity of 100 percent at 100 deg F.

obtained are iron, zinc or magnesium phosphates.

The main causes of paint failure are corrosion of the substratum and the lack of adhesion of the paint to it. Phosphating reduces the former and increases the latter because of its crystalline and porous nature.

Stainless steel tanks are recommended in all phosphate installations. Also as these solutions are readily contaminated, their position in the process lineup is of paramount importance. They should be so placed that acids and alkalies are not drawn over them.

Fig. 7 shows the advantages of a painted bonderized panel over an oxide obtained by heat treating as well as an alkaline cleaned panel. The superiority in salt spray may be explained in that the paint has obtained a foothold by flowing into the interstices between the microscopic crystals of the coating. This shows an important advantage of the phosphate coatings in which the corrosion areas are confined to the immediate area of the scratch. In the other panels, the growth around the scratch mark is more apparent and is not confined to the damaged area. In humidity, as shown in the lower panels, the contrast is not as great. It would be, however, if the test were run longer.

A particular phosphate coating, which is being used today in production, is Lubrizing. This is a process which is used the same as the black oxide. It has certain advantages over black oxides, in that it will entrap more oil and should be more satisfactory during break in periods. It has the disadvantage in that it might be more critical in processing variations, temperature changes and requires more chemical control.

(To be concluded)

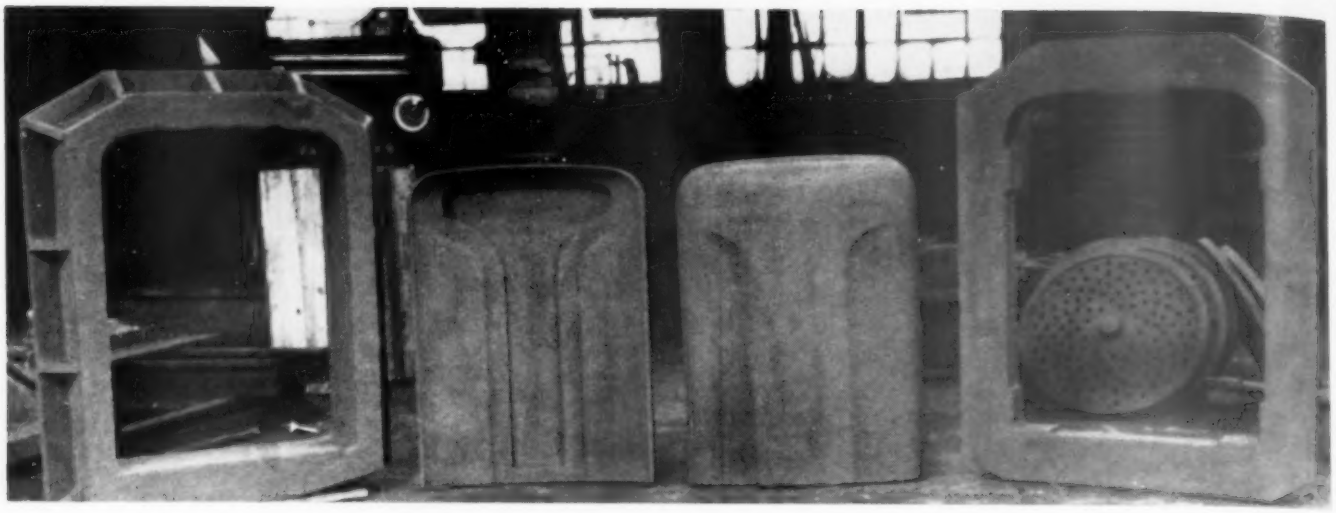
TABLE 1—COMPARISON OF PHOSPHATE AND BLACK OXIDE PROCESSES

Black Oxide Process

1. **Small dimension change.**
2. **More resistant to heat shock.**
3. **Should take less paint to cover.**
4. **Easy control.**
5. **Main Uses: To increase corrosion resistance and to reduce metal to metal contact, eg. gears, etc.**

Phosphate Coating

1. **Small dimension change in Lubrizing if controlled. Considerable in other coatings.**
2. **Better paint bond and lubricating qualities because of bigger crystals.**
3. **Less costly installation.**
4. **Shorter processing times.**
5. **Main Uses: Paint bond, Lubrizing to reduce metal to metal contact, eg. gears, bearings, eg. gears, bearings, etc.**



Gray iron cast dies, such as these which will be used to form door panels, are finding wide use in industry.

Gray Iron as a Die Material

By C. O. Burgess

TECHNICAL DIRECTOR, GRAY IRON FOUNDERS' SOCIETY, INC.

THE USE OF GRAY iron for dies and tools is not new. In fact, its unique value is recognized by some designers. By balancing the carbon and silicon contents in gray iron, adding special alloying elements such as nickel, chromium, molybdenum and vanadium, and in particular by the use of late ladle additions to molten gray iron (so-called inoculating additions), it has been found possible to control both the structure of the groundmass of matrix of gray iron and the tiny graphite flakes that are always distributed throughout the iron groundmass. This control of graphite size and distribution is of unusual interest and of great engineering significance.

Physical Properties Usable in Dies and Tools

Gray iron has, in fact, been called steel plus graphite. However, like most generalities, it is very far from being the complete story. It is true that a gray iron has a metallic groundmass that in general structure and hardness closely resembles that of steel (a 0.60 to 0.90 percent carbon steel in the case of a high strength cast iron). However, the behavior of gray iron, due to the presence of graphite, is modified in an unexpected manner.

On the adverse side, the presence of graphite flakes drastically reduces ductility so that gray iron shows comparatively little elongation as compared with a normalized cast steel. In addition, although gray iron may exceed in strength low carbon steels of the type used in weldments, its tensile or ultimate strength is less than would be anticipated for steels of comparable high combined carbon content. As if to compensate for such decreases, beneficial properties result from the presence of graphite in gray iron that, from the standpoint of a die maker, outweigh the above disadvantages. Some of these advantages are listed below.

In the field of tensile strength, 20,000 to 60,000 psi gray irons can be regularly specified (see A.S.T.M. Spec. A48-48). When it is realized that the yield point of gray iron is approximately 90 percent of the ultimate strength instead of the usual 50 percent to 60 percent shown by steel, it is at once evident that a 50,000 psi tensile strength iron is usually adequate even for the most severe uses, such as die rings, punches, blankholders, pads and bolster plates. Punch holders, spacers and certain types of die shoes can be made of lower strength 30,000 or 40,000 psi tensile irons. This possibility of using lower strength irons in non-critical sections is mentioned in case maximum economy is essential since normally, as in the case of steel, the higher the strength demanded the higher the cost. For example, if a 60,000 psi minimum strength is demanded in relatively heavy sections, it is usually necessary to resort to alloy additions with added expense.

The high yield ratio of gray iron noted above is important in die work when tensile stresses are encountered, and any tendency to flow or change dimensions must be resisted. It is believed that the graphite flakes in gray iron are largely responsible for maintaining this high yield strength.

Comprehensive Strength

Probably the most important physical property as concerns die work, however, is compressive strength. The compressive strength of gray iron is from 3 to 4 times the tensile strength, with the result that even the lowest strength irons have a compressive strength exceeding that of the usual normalized cast steel. Gray irons of moderately high strength will exhibit compressive strengths of around 150,000 to 165,000 psi. The significance of this property, again apparently conferred by graphite, can be appreciated when it is realized

that loads in die work are largely compressive. Records are available of gray iron die shoes withstanding 10,000,000 or more blows without distortion or flow in blank cutting operations on silicon steel sheet. This property of gray iron is sometimes forgotten when specifying supporting sections or shoes for use with dies of other materials such as tungsten carbide and hardened tool steel.

Graphite is responsible for another valuable property; i.e., improved machinability of gray iron as opposed to other ferrous materials. The economic importance of this fact is clear where large die sections or tool ways, for example, must be prepared.

The presence of graphite is again responsible for the fact that gray iron will build up a smooth, greasy surface much more rapidly than steel. This surface, in the case of gray iron, is self-lubricating in the early stages and finally develops a very fine matte surface which retains a film of lubricant much better than steel. This film has been found to be 300 to 400 percent thicker and consequently stronger than in the case of steel and is one factor that makes gray iron dies highly resistant to galling, scratching, sticking and pick-up.

Determining Factors

Other favorable properties associated with the presence of graphite that may or may not be of primary importance, depending on die or tool design, are high damping capacity or ability to absorb vibration, and low notch sensitivity. The first property might be determinative in selection of gray iron for tool shanks, and the latter property the determining factor when sharp fillets or notches have to be tolerated without the large loss in fatigue strength that would be observed in the case of steel.

Before leaving the question of physical properties, it should be noted that gray iron can be hardened by any of the conventional methods, such as oil or water quenching and flame or induction-hardening. If a comparatively high strength iron with a pearlitic groundmass "as cast" is originally selected, the response to hardening is somewhat similar to that of an 0.85 percent carbon steel. The fact that there is comparatively little distortion on hardening gray iron is of vital interest to both die and tool makers. It is sometimes not realized that a gray iron die can be made up and tried out previous to hardening. If satisfactory in actual test, leading edges of punches, corners of die rings, and working faces generally may be flame-hardened without appreciable distortion or the necessity of laboriously regrinding and refitting hardened inserts. The same tendency to dimensional stability has led to the wide use of high-test gray irons in the tool field for large precision plates, angles, straight-edges, master gears, jig borers, machine ways, etc.

Gray Iron Characteristics Affecting Die and Tool Design

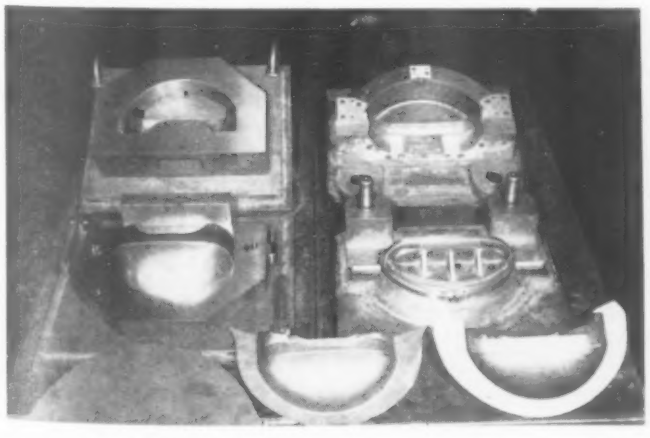
Any gray iron component is primarily a casting. There are inherent advantages in the casting process as compared with any other forming methods. For example, a large, difficult, complicated member can be economically made in a single, streamlined piece; the metal can be placed exactly where needed to take the load, machining allowances need be left only where absolutely necessary, reinforcing ribs can be easily cast on in critical sections, etc.

The casting process is made even more attractive because of the ready castability of gray iron. This high order of castability is based on the high fluidity, the ability to faithfully reproduce a pattern, and the comparatively low melting point and low shrinkage of gray iron. But—and this cannot be overstressed—it is always advisable to consult your foundryman, preferably in the early stages of a casting design, and finally to cooperate with the foundry selected as concerns suitable, workable pattern equipment. Without such consultation a design may unwittingly present a maximum number of difficulties to the foundryman. He may be forced to resort to costly expedients to even approximate the lower cost, improved soundness and higher functional efficiency which would have been possible with a slight change in casting design.

The basic problem of the foundryman is to cast a liquid metal into a mold and take out of the mold a high quality, solidified product that will meet close tolerances. This operation is complicated first by the fact that a considerable decrease in volume accompanies a change from the liquid to the solid state. This means that the ideal casting would have, as far as possible, equal section thickness throughout, so that solidification and consequent shrinkage will take place in a uniform fashion and can be allowed for. Often, however, the design calls for a heavy section attached to a thin section, and in this case the design must be such as to promote directional solidification from the thinner to the larger section and permit attachment of a feeder or riser (external reservoir of molten metal) to the heavier section.

Aggravating Conditions

This condition is particularly aggravated if a design is such that it is necessary to feed a heavy section through a thinner section. In such cases the thinner section freezes off while the heavier section is still molten (a so-called "hot spot"). If no provision has been made for continuously supplying hot metal to the heavier section a void or porous area naturally results when the heavier section finally solidifies and contracts. This can only be prevented by the awkward expedient of using chills or denseners to speed solidification of the heavy section with a probable sacrifice in casting quality. Early consultation between the customer and the



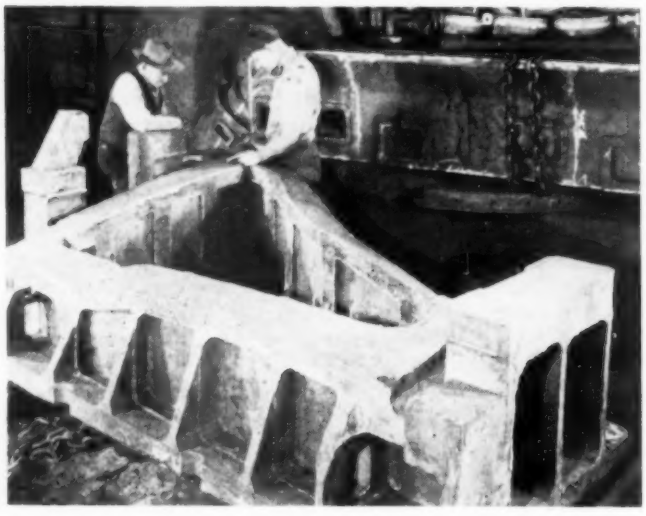
Set of forming and trimming dies for producing wash basins.



Bed, ring and punch of typical gray cast iron forming die.

foundry would have undoubtedly avoided this dilemma, improved casting quality, and very probably resulted in a substantial saving in weight and cost of the casting.

The second problem is connected with stresses set up on cooling from solidification to room temperature. The resultant stresses although usually more drastic in castings are to some extent common to both castings and heat-treated parts. Stress analysis has shown that very high stresses develop at sharp fillets, corners or inside angles. These are particularly aggravated by sudden section changes where normal contraction is hampered. Although cast iron is less subject to hot-tearing than steel and most other cast metals, it is still advisable to make sections as uniform as possible and particularly to specify generous fillets (sometimes called "fat fillets") with radii usually varying from one-half to one inch. It should not be forgotten that the streamlining involved in avoidance of abrupt section changes and larger radii will also



This unfinished binder ring will later be used in the forming of a rear quarter panel in automobile body manufacture.

pay dividends in fewer scratched stampings and in higher production per die.

Recapitulating, the designer should not be burdened with foundry problems but should realize that by leaving pattern details to the foundryman certain definite benefits are obtained. These are namely:

(1) Adequate allowance for liquid and solid shrinkage.
(2) Provision of proper machining allowances.
(3) Proper spacing of reference points for machining.
(4) Ample provision for cores and their anchoring.
(5) Sufficient draft for pattern removal.
(6) Use of the least complicated type of parting line.
(7) Economical production of castings to the designers' specifications.

Summary

The unique properties of gray iron castings of controlled analysis that make them directly applicable for use in the die and tool industry, have been reviewed. The increase in efficiency and economy that results from early collaboration of designer and foundryman has also been outlined. This has been emphasized despite the fact that considerably greater latitude in design is normally permissible in gray iron than in other materials.

Actually, though there are particular operations involving sharp fillets and 90 deg bends where hardened tool steel or even tungsten carbide are advisedly specified as inserts, gray iron should find little competition in the great majority of die applications. In fact, it is frequently capable of doing a much superior job than is possible with much more expensive competitive materials.

Dies for Swaging Operations

SWAGING OFFERS a rapid and economical method for mechanically working metal into the desired shape by a series of hammer blows, rapidly applied over a form whose sides are concentric. Swaging possibly should not be distinguished from other cold forming operations, since it has much in common with them. The process yields the same desirable grain structure as that obtained in forging, without the appearance of objectionable scale. The work surface is made harder, a uniform grain structure is produced, and elastic limits of the metal are increased, resulting in physical properties which are difficult, if not impossible to obtain by any other method.

Precision, speed and ease of operation are the principle advantages in swaging. Unskilled operators may be employed to produce work to exact dimensions. The methods yield a high finish; the process is faster than turning; parts are formed without loss of material; various types of steel, brass, bronze and aluminum can be handled; and long die life can be obtained. The method is also efficient in the fabrication of tubular parts. Tube diameters are reduced, different forms can be produced, wall thickness increased—thus providing increased strength and sufficient tube cross-section thickness for threading or other machining operations.

The Four-Die Machine

Swaging machines, ordinarily furnished with two dies, are available with four dies and four backers, as shown in Fig. 1. The four-die head works on four sides of the piece simultaneously, virtually doubling the working surface, and increasing the speed of reduction. In addition, heavier work can be done without excessive loads on the machine parts. The finish, however, is not as good as that from the two-die heads, and the four-die method is not recommended where the stock to be reduced is less than 3/16 in. in diameter.

The swaging dies are carried in slots in the face of the revolving spindle, and are held between hardened blocks (called backers) having rounded ends that contact the rollers. Around the spindle is an annular rack containing a number of hardened steel rolls. As the spindle rotates the ends of the backers pass between successive parts of opposing rolls, forcing the dies together. The die pressure is adjusted by placing hardened steel shims between the dies and backers. Both the dies and backers are held in place by a hardened face plate. Rotary swaging includes pointing, forming and fitting operations. Figs. 2, 3 and 4 present typical swaging applications for both solid and tubular work.

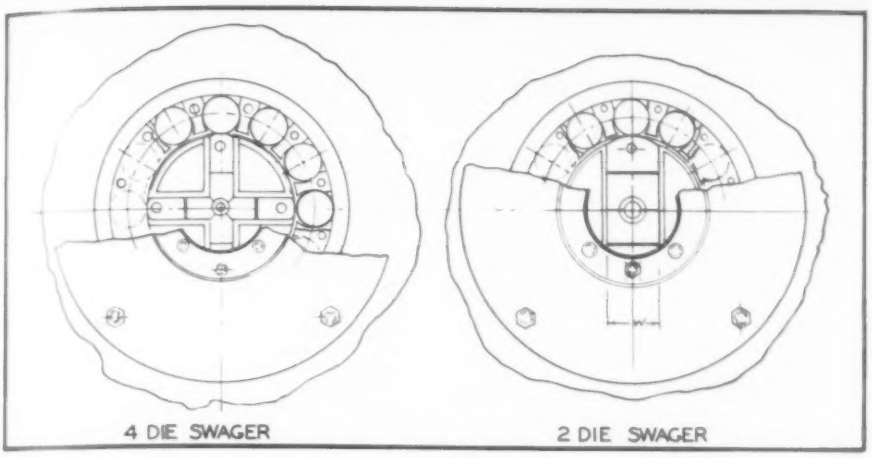


Fig. 1. Difference in design and construction between the two- and four-die swager can be seen in the drawing above. Since the four-die head works on four sides of the part simultaneously, speed of reduction is increased, and heavier work can be accommodated.

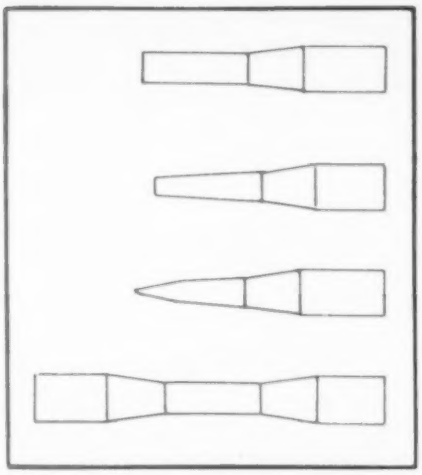


Fig. 2 illustrates typical swaging application (from top to bottom) straight reduction, taper reduction, pointing, and central reduction.

By John Mueller

ASSISTANT SUPERINTENDENT

THE CLEVELAND HARDWARE AND FORGING CO.

The effects of cold working set up limitations on the amount of material that can be handled in one pass in the swaging dies, although this can be counteracted in certain cases through proper annealing. The blank may require annealing after each reduction until the required degree of reduction is achieved. Generally, the higher the carbon content of the steel the less reduction can be handled in a single pass. Again, circumstances may require that swaging be done hot. Small machines have a water cooling jacket around the head, while larger machines have a recess back of the inside ring for water cooling. Sometimes an air blast is applied through the spindle for cooling and removal of scale from the dies on hot swaging operations.

Swaging die blocks are of hardened steel, with impressions sunk into mating blocks in the manner of drop forging dies. Hard inserts are used with some degree of success, and in many instances hard facing of low-carbon steel dies are said to give good results for hard materials or hot swaging.

Proper proportions must be worked out between overall dimensions of the die and the size of the impression to prevent fracture of the die in use. The dies are ground square on all sides to provide the perfect alignment required for accuracy. The machining of the die impressions requires two operations: boring and reaming of the straight portions of the die (which diameter establishes the size of the finished piece); and the machining of the tapered section (the feed or mouth of the die where the stock enters). Small impressions for small diameter work are bored and reamed, then lapped after hardening. Impressions large enough to permit grinding are preferably ground because of the greater accuracy.

Large Diameter Work

It is considered good practice not to lap smooth the tapered section of the impression except on small diameter work, where the reduction is small and a high finish is essential. However, on large diameter work where the reductions are large, or on steep tapers, it has been found advantageous to roughen the tapered section, thus breaking up the stock surface, avoiding kickback and facilitating feeding, especially when fed by hand.

Satisfactory die life is dependent upon manufacturing and maintenance conditions, as well as operating considerations.

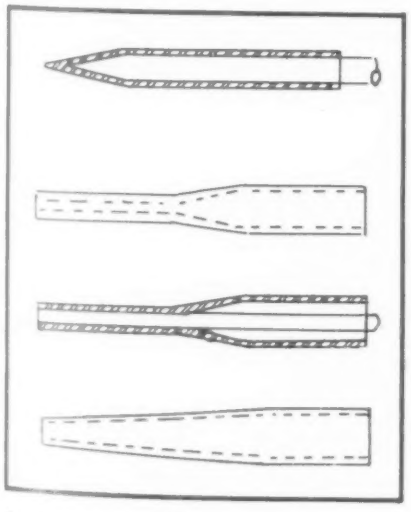


Fig. 3 illustrates pointing with mandrel, straight reduction with mandrel, and long taper with or without mandrel.

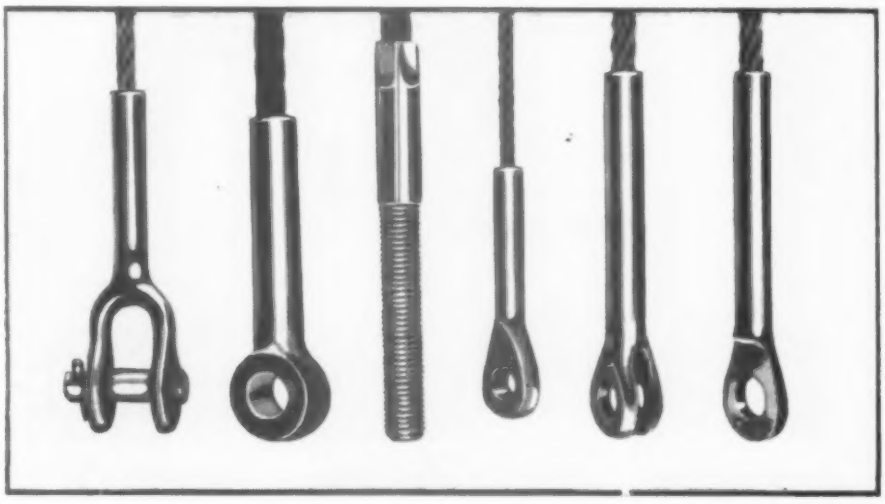


Fig. 4. These cable control assemblies present several variations of interesting swaging applications.

—Courtesy MacWhyte Co.

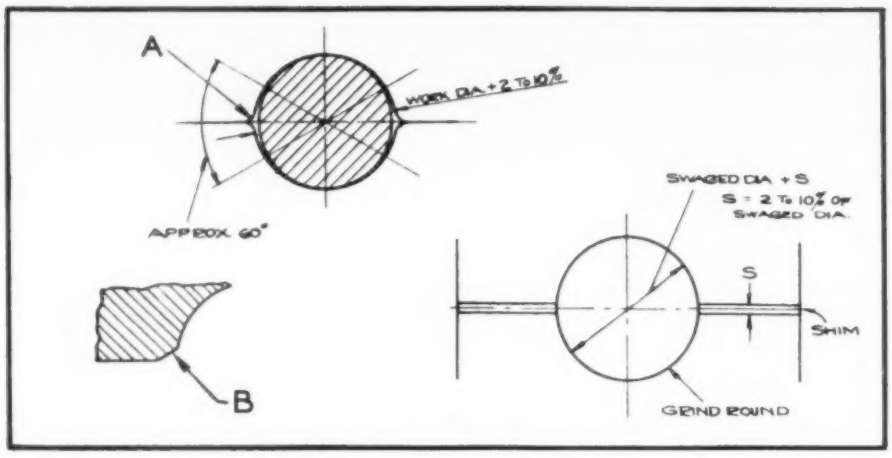


Fig. 5 (left) and Fig. 6 (right) illustrate the provision for an oval effect in the swaging dies. Note that at *A* in Fig. 5 there is no sharp corner where corner radius joins the groove. Point *B* in Fig. 5 shows the undesirable design. Fig. 6 shows design for shim.

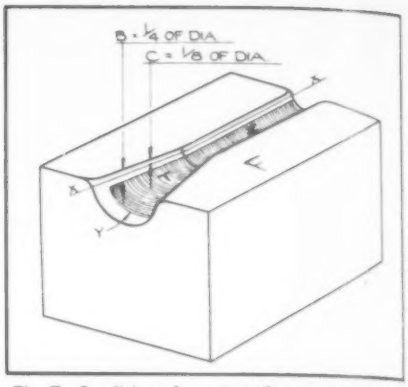


Fig. 7. Condition of swaging dies can be noted by their appearance, as can be seen above, where the new die performs the reduction in the shaded area show as *T* and *Z*. As the die becomes worn, the work area gradually creeps up to the line *X-X* or higher.

Trapped metal is ruinous to swaging dies. Metal flowing under great pressure will cause cracked dies or spalled die grooves if the metal is confined too closely. Metal flow takes place in all directions, radially and lengthwise, and if the impressions are not shaped properly, pressures are created beyond the capacity of the hardened dies. For this reason, dies used for swaging solid stock are given an approximately oval shape to provide a small amount of side clearance which relieves any excessive splitting pressures.

This oval effect is obtained by inserting oval shims between the dies and when boring, grinding or lapping (as shown in Figs. 5 and 6), and relieving them for approximately 60 deg of the circle. The shims should be from 2 to 10 percent of the work diameter depending upon the material being swaged and to some extent upon the size of the die groove. Table I shows the method for figuring the oval in swaging dies. Very small grooves require proportionately more clearance than larger ones, due probably to the fact that smaller grooves require a greater amount of pressure to "flow" them, resulting in higher surface friction. The taper in the die requires 0.002 to 0.004 in. more shimming than the straight portion of the die.

Table I—METHOD FOR FIGURING OVAL IN SWAGER DIES

<table>
<tr><th>Dia.</th><th>Drill Rod Alloy St's</th><th>Low Car. Steel</th><th>Hard Brass</th><th>Copper</th><th>Lead</th></tr>
<tr><td>¾</td><td>———</td><td>———</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="15">No Blocking</td></tr>
<tr><td>11/16</td><td>———</td><td>———</td></tr>
<tr><td>⅝</td><td>———</td><td colspan="3" rowspan="7">Taper
.001/Degree + ½ of 1%
of Max. Diameter
Blade
Above Value Less .003
.004</td></tr>
<tr><td>9/16</td><td rowspan="7">125% of Value for L. C. Steel, Etc.</td></tr>
<tr><td>½</td></tr>
<tr><td>7/16</td></tr>
<tr><td>⅜</td></tr>
<tr><td>5/16</td></tr>
<tr><td>¼</td></tr>
<tr><td>3/16</td><td colspan="3" rowspan="3">2%
3%
4%
of Average Diameter</td></tr>
<tr><td>⅛</td></tr>
<tr><td>1/16</td></tr>
<tr><td>1/32</td><td colspan="3">Stone Edges of Groove</td></tr>
</table>

TUBING

When O.D. = 25 or Over × Wall Thickness, Use No Blocking

When O.D. = 10 to 24 × Wall Thickness, Use 60% of Solid

When O.D. = 6 to 9 × Wall or Less, Treat as Solid as per Above Chart

Corner Radius on Groove
1/16 Blade Diameter to Nearest .005
or 1 × Wall Thickness of Tube

Overfeeding frequently causes split dies, and this no amount of side clearance can remedy. One inch per second is as fast as the work should be fed. This can be controlled more or less automatically with the proper amount of die opening (space between the dies in open position).

Avoiding Split Dies

Fig. 7 illustrates condition of the dies as indicated by appearance. When the dies are new, the area of contact between the work and the dies is indicated by the shaded area *T-Z*. All the work of reducing is done in the section marked *T*, while the straightening and final sizing is done in section *Z*. When the dies are new, the boundary of these areas is about ¼ in. of the diameter from the edge of the groove as shown at *B*. As the dies are used, the boundary creeps up toward the edge of the groove, due to the wearing away of the high pressure points in the groove. This is visible to the naked eye as areas *T* and *Z* become burnished from flow of metal. The boundary should not be allowed to creep beyond *X-X*, or about ⅛ in. of the diameter from the edge shown at *C*. Prolonged use beyond this point will result in split dies and they should be redressed immediately.

Sometimes an annular groove will become worn into the taper at *Y*, which is the point where the work first contacts the dies. While this will not cause split dies it will cause difficult feeding, and the dies should be redressed. Face *F* should be ground off in the same amount taken out of the groove. It is claimed that about 90 percent of all swaging die breakage is due to failure to keep the dies properly ovaled, and less than 10 percent of swaging failure is due to poor material or improper heat treating of the dies.

Ordinarily, the best holding medium for holding and feeding cold work is the hands, but swaging abrupt tapers or swaging close to shoulders makes feeding difficult, and some kind of feeding fixture is necessary. Often several reductions are made to reduce the part to the required size. Very long tapers are difficult to swage and it is found more practicable to use more than one set of dies. For large quantity production swaging work, special attachments are available for locating and lining up long rods or tubes; spring ejectors are used for short pieces; adjustable work stops control the length of swage.

By A. E. Rylander

Ingenious Tooling Solves Broaching Problems

Broaching after Assembly insures stay-put Accuracy of Mating Parts.

AN INTERESTING solution to a rather intricate assembly problem was worked out by tool engineers of the Underwood Corporation, manufacturer of typewriters, 1 Park Avenue, New York City, and the Colonial Broach Co. of Detroit. In the manufacture of guides for typewriter carriages, as produced by Underwood, it is important—in view of the sensitive operation of the carriage—that the Vees on opposite sides of the guides line up accurately.

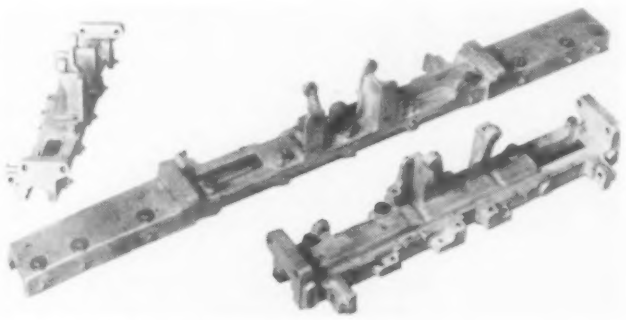


Fig. 1, showing the finished carriage guides for Underwood typewriters. These guides are made for two series of typewriters, one guide being 14 in. and the other 26 in. long. The Vees in the casting and the steel inset are plainly discernible in the part shown at top center. To insure accurate alignment, the Vees are broached after assembly.

As shown in Fig. 1, the guides are made in two different lengths—one 14 in. long, the other 26 in. long—to suit two sizes of typewriters. The main part of the guides is made up of two components, a cast iron body and a steel bar inset. These components have each a V-groove diametrically opposed and required to align accurately, as stated above. Should the Vees in the two components be machined separately and subsequently assembled, there would occur considerable chance for inaccuracy and misalignment.

Setup Eliminates Errors

To obviate any chance of such error, due to subsequent assembly, Underwood broaches the Vees after assembly even though the one part is steel and the other cast iron. The cast bar is first broached as shown at left, Fig. 2; then, after assembly with the steel bar, the two Vees are broached in one pass using a double-toothed broach. The machine used is a 10-ton Colonial Universal Horizontal with 72 in. stroke.

Inasmuch as the guides are of two lengths and are further required to be interchangeable, a number of factors had to be taken into consideration when designing the tools. For one thing, the fixture had to accommodate both lengths of parts, each loaded, clamped and unloaded with equal facility. Also, the broach had to be designed to cut both steel and cast iron in the one pass, and was further required to be accurately guided for the full length of the cutting stroke.

Same "Hook" for Both Materials

The fixture was therefore designed as shown in the close-up, Fig. 3. The broach is guided by "towers" running the length of the fixture, and the parts are accurately located by means of plunger locators, cams and equalizing clamps, some or all of which are used, depending on the length of the part. Once in place, the parts "stay put" during the broaching pass. Incidentally, it was found that the same "hook" could be used for the broach teeth on both sides, thus materially simplifying the grinding of the teeth.

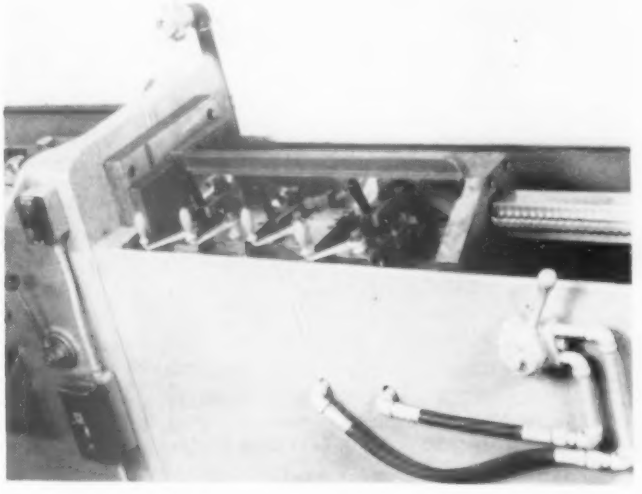


Fig. 2, showing the broaching setup, with fixture. The machine used is a 10-ton Universal Horizontal with 72 in. stroke, by the Colonial Broach Company, Detroit. The double-toothed broach is guided the full length of the stroke in the workpiece, and the fixture is designed to accommodate two sizes of carriage guides. Either size part is held in the fixture by cams, locating plungers and equalizing clamps.

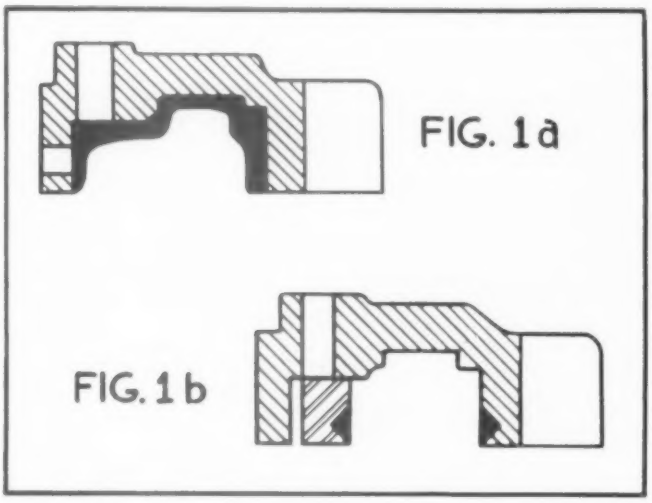
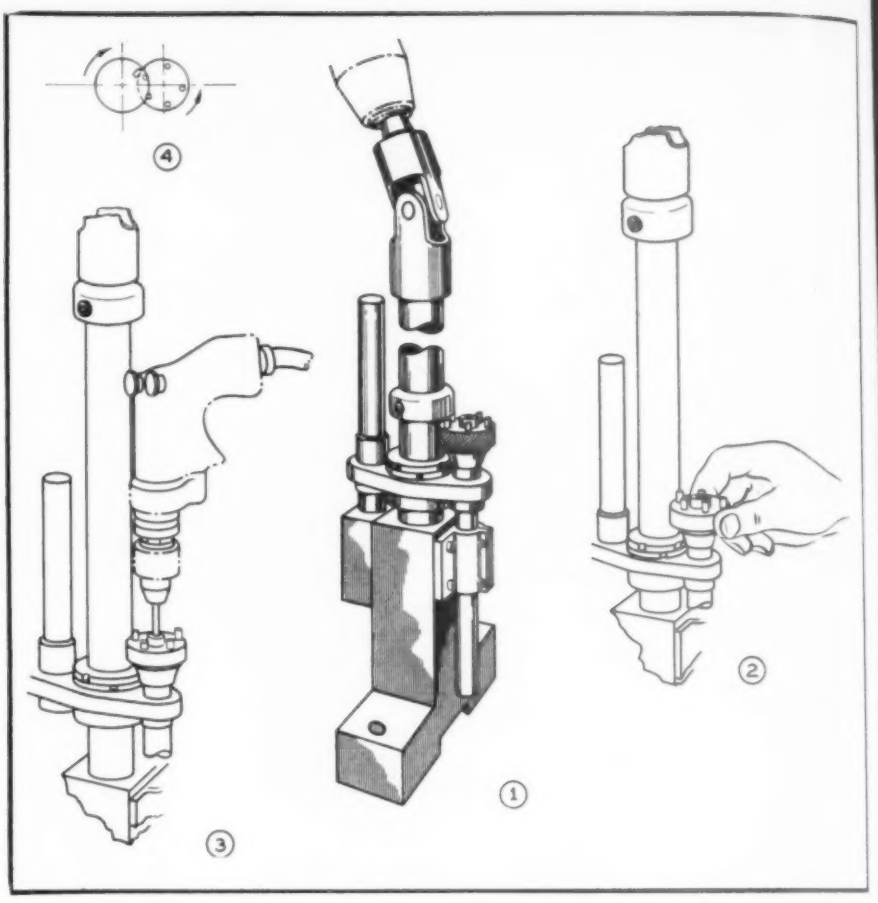


Fig. 3. An important consideration, in the manufacture of guides for typewriters, is that the Vees on opposite sides be machined in absolute alignment. To avoid chances of error that might occur in subsequent bench assembly, Underwood Corporation broaches these Vees after the steel insets are assembled with the casting. The metal indicated in the shaded area, at left, is removed in the first broaching operation. The steel bar is then attached and the two Vees broached as shown in the section at right.

Portable Jig Borer

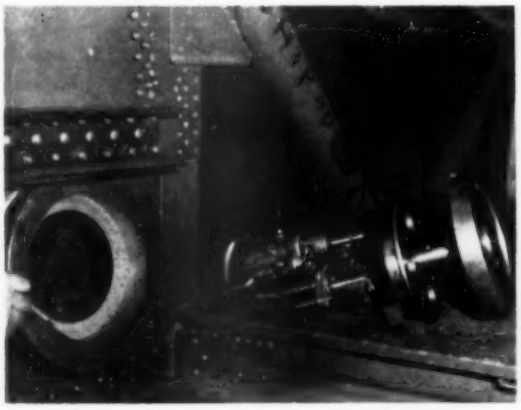
Convair Saves Setup Time with Low Cost Device

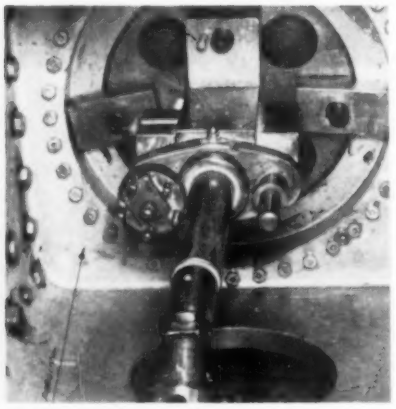


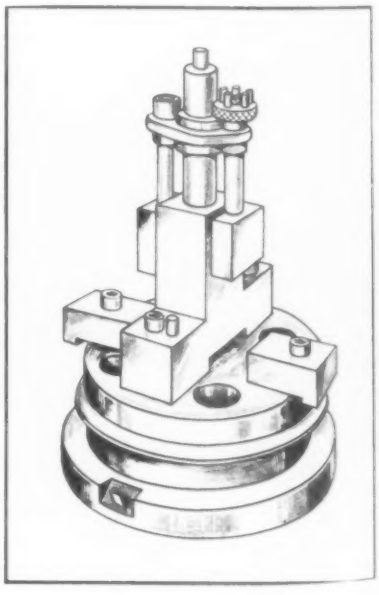
A RECENT TOOLROOM development of the Fort Worth division of Consolidated Vultee Aircraft Corporation is a portable jig borer, designed to expedite precision work on forgings or castings which are assembled on major airplane components. Invented by J. B. Davis, Convair toolmaker, the device has been used successfully for several months at the company's Fort Worth and San Diego plants, and has resulted in savings amounting to several thousand dollars.

The tool can be applied to jobs that the standard jig borer can do, but in addition can handle many jobs which are not adaptable to the standard equipment. It is especially adaptable to jobs on components which are too large to handle on stationary boring machines, and to fittings already installed on completed major assemblies. For example, in the case of a large plate, perhaps 6 x 12 ft, to be jig bored, the use of a standard borer would be difficult. With the portable unit, however, the plate could be worked on a standard surface table using tooling buttons, which can be picked up by the device with an accuracy of ± 0.0002 in.

In a number of instances the unit has acted as a safety device, particularly when drilling large holes, such as two inches, in a plate that cannot be brought to the machine. Since most often drills over $\frac{3}{4}$ in. used in hand drills can create a dangerous condition, any danger can be obviated



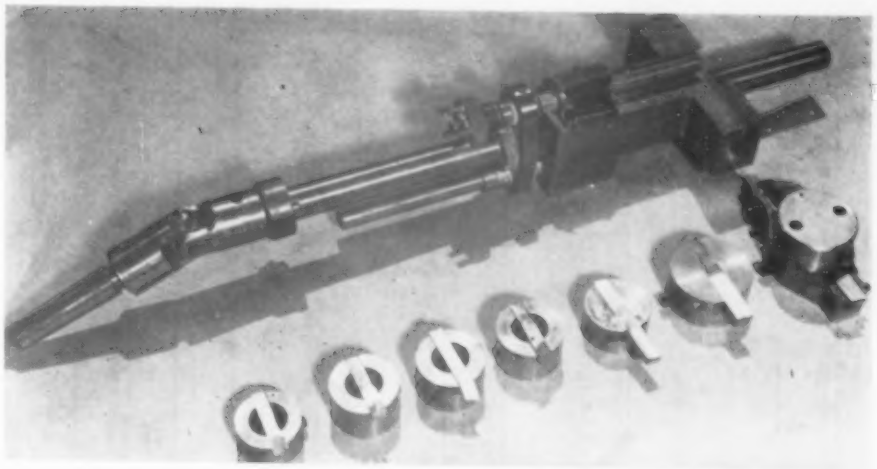




This large box-type wing forging for the B-36 landing gear fitting had already been completely bolted and riveted in place when it was discovered that structural loads had caused the close tolerance diameter of the bearing surface opening to become 0.005 in. eccentric. An adaptor (shown in detail in drawing at right) was constructed for the portable jig bore and one cut was taken per forging. To scrape the bearing surface would have required from 8 to 12 hours, whereas with the portable unit the job was done with one hour required per fitting. Note the large size of forging as indicated by the arrow in the center photo, and the complex structure into which it is assembled. Photo at left shows the exterior of the forging.

(Left) Shown at (1), automatic feed is accomplished by the slip collar rotating with the shaft, turning the knob. Feed is 0.004 in. per revolution of the shaft. Direction of feed can be changed by reversing the motor. At (2) the slip collar is disengaged by backing off the set screw shown on top. Manual operation can then be used. At (3), rapid travel is obtained by a using a reversible motor.

(Right) The simplicity of the jig borer is seen from this photo of the assembly. Shown also are various precision-set cutting tool adapters. →



with the portable jig borer, which can be easily attached and permits several cuts to be taken without any danger of hanging up.

Convair has found that in transferring holes from transfer plates to master plates, considerable time is saved by the use of the tool. It has been learned that by using a step-pin, the position of the hole can be obtained easily and time is saved in locating the hole.

The device comprises a block base having a face-normal alignment hole, a precision calibrated disc for feeding the cutting tool, a concentric boring bar with a universal drive joint at its upper end and a cutting tool insert at the lower end. A balanced feed arm assures rational cutting and feeding speeds for the device. Various auxiliary attachments are also used, including a drill and adaptor bar, a step-pin ended bar, a boring bar with adjustable tool attachment, a pickup bar for tooling buttons, and a setup adaptor plate.

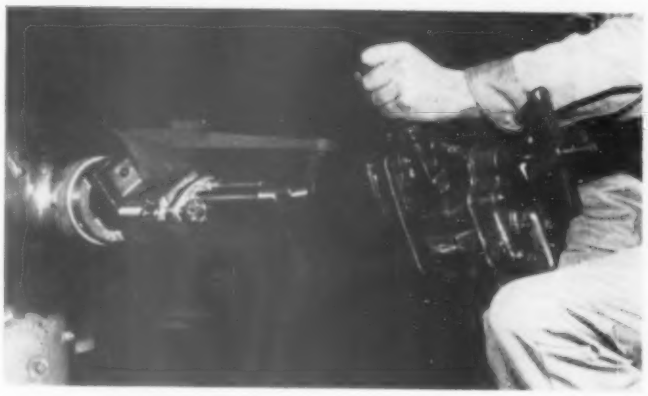
The light-weight jig boring tool can be driven by any conventional electric or pneumatic hand motor.

Sine Plate Attachment

One of the attachments for the jig borer is a sine plate, which may be used in a number of ways. For example, if one were to transfer a hole from a master plate on a one deg angle, to another plate on the same angle, the sine plate and master plate would be lined up with a pin (or step-pin). The sine plate is adjusted and clamped, the pin removed and the boring bar inserted to complete the operation. The sine plate may be set on a given angle and placed on a plate, lining up by using cross lines.

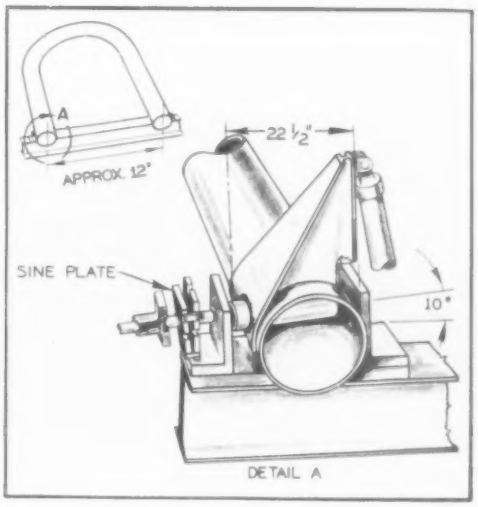
There are a number of ways to place the unit in boring position. When reworking a landing gear casting, an adaptor was made to clamp on an existing flange, which automatically aligned the machine as well as clamped it to the work.

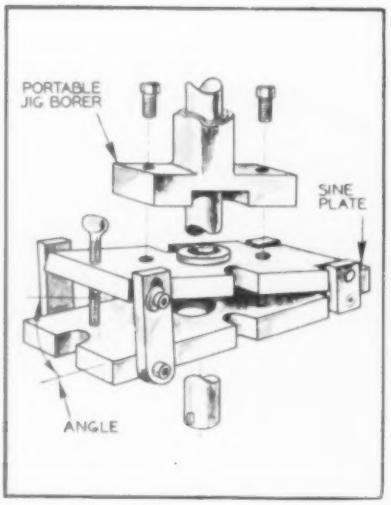
The job shown below required that the landing gear main column be bored through after the forged drag strut tie-in fitting was welded into place and the other components assembled. The alternative would have required dissembly of the landing gear composite from the plane, then dissembly of the components and removal of the main column to a boring mill.



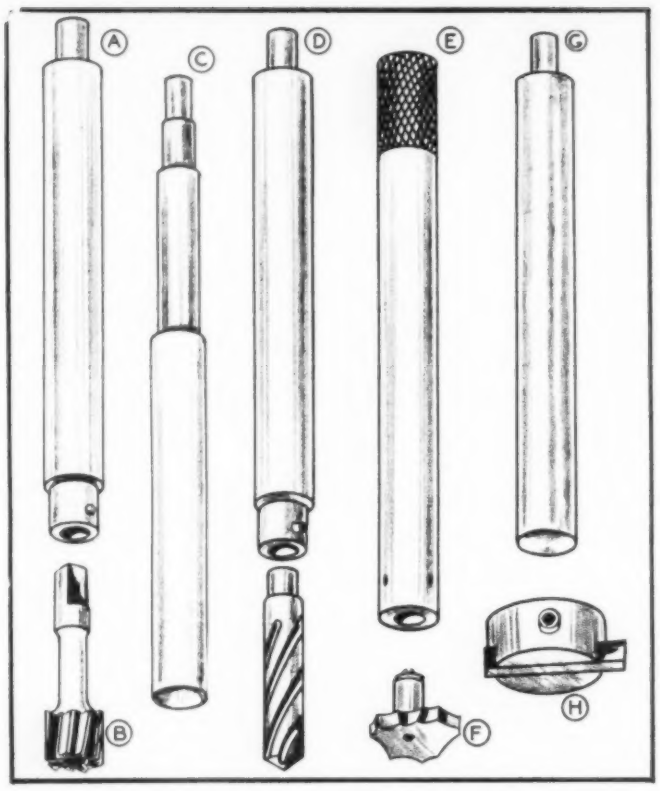


This boring job was accomplished in the construction of a large bomb truck and hoisting dolly. The assignment—to bore two 4 1/16 x 22½ in. holes on a one deg angle. The holes were 12 ft apart at the ends of the horse shoe-shaped tubular truck frame. A holding fixture was constructed comprising an I beam and required angle plates (center), which were precisely set on a surface table.

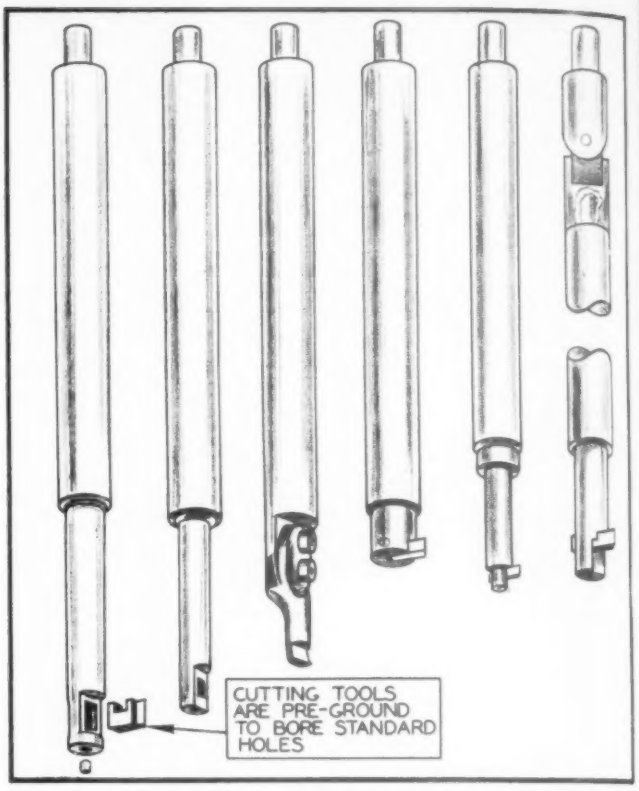




The one deg angle was set by the sine plate in the manner illustrated. The opposite angle plate carried a bushing to journal the boring bar.



Some accessories of the portable jig borer are shown in the drawing at left. Seen at A is an adaptor for the set; at B is the jig borer set. Shown at C is a step-pin for picking up tooling holes, transfer holes and others, while at D an adaptor for the standard drill is illustrated. E shows another adaptor for picking up tooling button.



and the tooling button is presented below at F. The boring bar is illustrated at G, and at H is the head, which can be removed for replacement of pre-set tool or for resetting the tool. Shown in the drawing at right are typical boring bars used with the portable jig borer.

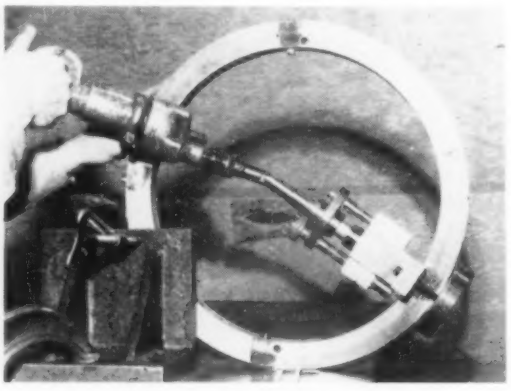
Another method is to place a shaft or pin through existing holes and then pour Cerrobend under the face of the machine. The latter is time saving in cases where the hole is not normal to the surface. Where holes are too large for a step-pin, an indicator may be used.

The boring bars are made of drill rod or cold-rolled steel, allowing bars to be made at minimum cost. Bars used on production jobs can be hardened to permit longer wear. In addition, bars can be made to machine certain desired sized holes. On one particular occasion, a tool machined 24 different holes, boring within 0.0005 in. On small holes, it has been found that having pre-set tools are an advantage (such as $\frac{1}{2}$, $\frac{3}{4}$ and 1 in.). Clearance holes can be drilled with handmotors or with drills and end mills adapted to a bar. In some instances clearance holes can be drilled by drill jigs or drill presses.

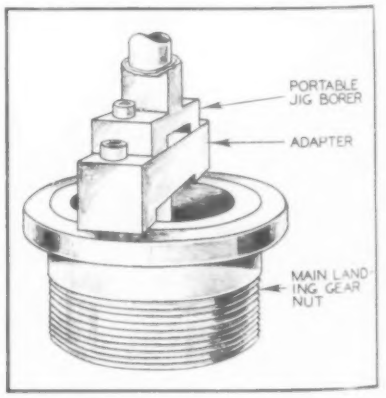
A number of methods of setting the holes are available. A depth micrometer can be attached to a block, and the various cuts set by this method. A pattern often used by machine shops is to take a cut in the hole, mike the hole, then place an indicator on the tool, moving it the desired amount for the next cut. Where the holes are sufficiently large, the most popular method is to use heads that slip on the end of the bar and clamp with the aid of a set screw. These heads are easily removed to permit resetting of cutting tools or placing of another pre-set head on the bar.

Construction cost of the portable jig borer is small, and smaller machine shops would probably find many uses for the tool. For re-boring where costly equipment would otherwise be required, or where the component must be dissembled at considerable cost, the unit has a number of advantages.





Another interesting application of the portable drill jig is the one shown above, and center, which required that a series of holes be transferred from a master ring to the drill jig. The hole transfer could have been accomplished on a stationary jig, but at a total time cost of ten hours for setup and operation. Both amounted to two hours with the portable unit.



The setup shown in the sketch at right was used in the case of a main landing gear nut which was frozen to the pivot shaft. After trying several methods, it was decided to bore off the nut or cut the pivot shaft. Rather than destroy the shaft at a cost of several thousand dollars, the portable jig unit was adapted with the plate shown in the drawing, and used to bore the nut.

By A. W. Baumgartner

34-92000

Design and Manufacture of Forming Rolls

WHILE FORMING rolls for moldings and tubes look simple enough, both from a design and manufacturing angle, their development may be favorably compared to that for dies for press blanking and forming operations. For example, blank size and recurrent deforming—the latter comparable to drawing—are both vital considerations. Also, the same care must be taken with regard to tool materials, hardening and surface finish. The latter especially since a considerable proportion of moldings are pre-plated in the strip.

Whether or not a molding is symmetrical from the center line, accuracy is essential since there must be no sharp demarcation between succeeding pairs of rolls. The relative diameters of each bank of rolls must also be accurately maintained, together with the break lines, the latter especially so since any lateral deviation would tend to cut or shear the stock. The surface of the rolls must be highly polished after hardening.

Shown here are forming rolls for three typical jobs. Fig. 1 shows a laminated tube of stainless steel with a cold rolled inner tube, the latter a reinforcement for the comparatively thin outer shell. The two components are not sweated together or otherwise joined prior to forming. Rather, the inside tube is placed in the outer at the start of the second operation, and the two are then processed as one part through to the final pass. The sequence of operations is shown in Fig. 2, with the various stages explained in the caption.

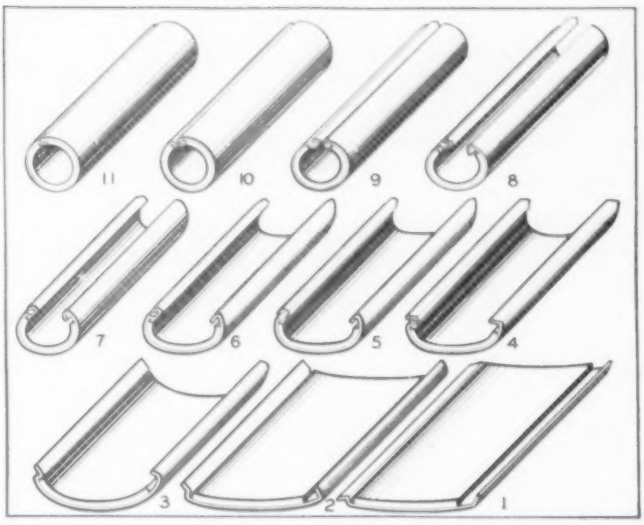


Fig. 1, a stainless steel tube with a cold rolled steel core. The two tubes are not sweated together or joined in any way prior to forming; rather, the inner tube "creeps" in the outer during the forming operations. The final—No. 11—operation is similar to No. 10 and is for final sizing only.

A. W. Baumgartner has spent many years in the manufacture of rolled shapes and moldings, and in the design and manufacture of incidental tools. He is co-founder and president of B&C Form Roll & Engineering, Inc., Chicago, Ill.

Note, here, that rolls Nos. 1, 2 and 3 are solid steel, while the inside section of the balance of the rolls is made of bronze to prevent marring or scoring the material. That is, for the actual curling of the stock; as will be noted, a steel tongue is incorporated in rolls Nos. 4 to 9 inclusive. This tongue is

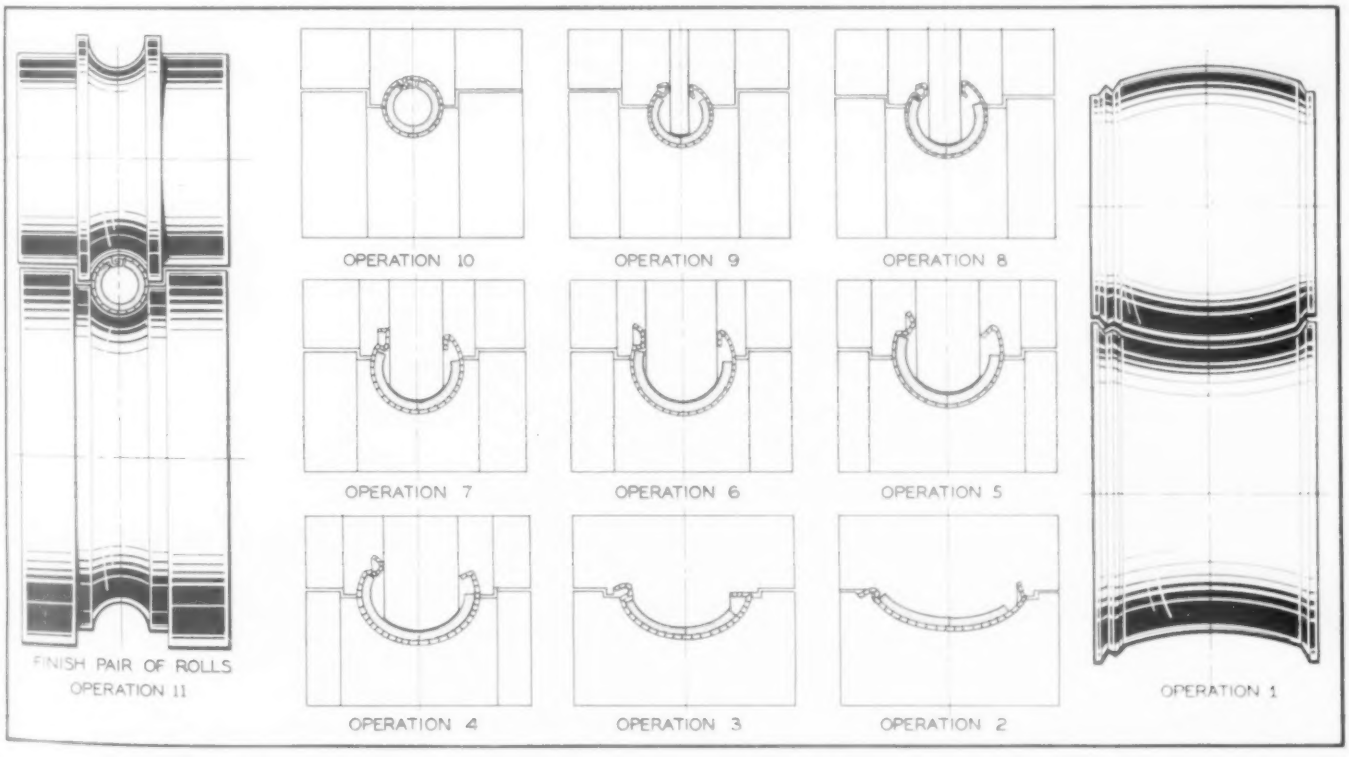


Fig. 2. The forming rolls used to form the laminated tube shown in Fig. 1. Rolls Nos. 1, 2 and 3 are of solid steel, while the center part of the balance of the rolls is made of bronze, except for the tongues shown in Nos. 4 to 9, to prevent scoring or marring the material being rolled. As explained for Fig. 1, No. 11 roll is exactly like No. 10 as far as size is concerned, and is use to true and resize the tube after locking the seam at No. 10. Starting with No. 1 roll, the diameters are stepped up to 0.015 in. on each pair.

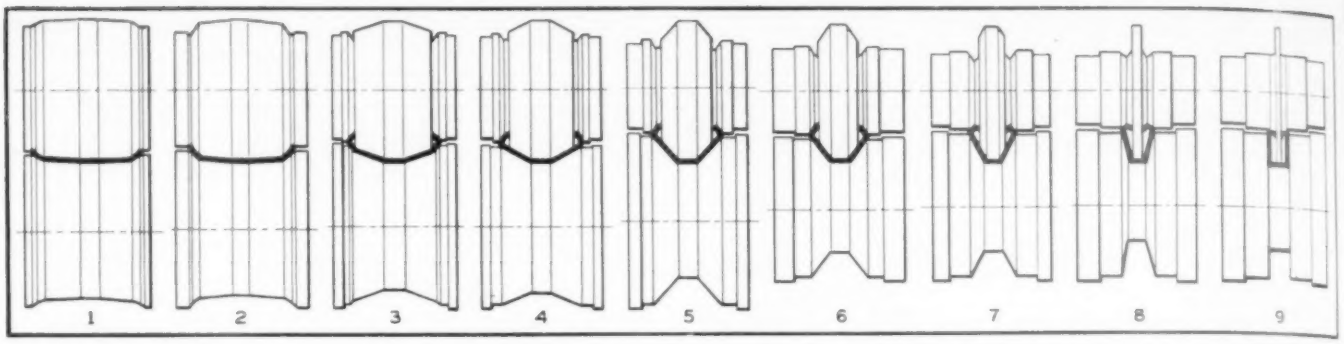


Fig. 3. Rolls used to form the rectangular box molding shown between the rolls. Here, the major diameter of the upper rolls remains the same from No. 1 to No. 9, the line of contact with the upper part of the strip forming a straight line across the entire set. The rolls are run in tandem, the metal running through continuously from pair to pair of the rolls.

located at the point of greatest pressure against the stock. Roll No. 11 is exactly like roll No. 10 and is used to true and size the tube after the seam is locked.

Fig. 3 shows the rolls and operation sequences for forming a rectangular tube. By referring to the rolls for Operations 1 to 11, Fig. 2, and also to those in Fig. 3, Op. 1 to 9, it will be noted that the upper rolls appear to be smaller than the bottom rolls. To a considerable extent, this is an optical illusion. However, it so happens that, for the first pass, the largest diameter of the upper roll less the stock thickness, and this line of contact—that is, the bearing of the upper roll against the top surface of the stock—is maintained throughout the entire set of tandem running rolls.

At this point, which is also the point of greatest pressure, the surface speeds naturally vary somewhat. For this reason, the center part of the rolls is made of bronze, to prevent marring as previously explained. The variation in surface speed causes a wiping or scuffing action which must be considered in both design and manufacture.

Fig. 4 shows the stages for rolling a 6 in. wide stainless steel molding. The material is 0.018 in. thick, and the strip is 7-37/64 in. wide before forming. This forming may be compared to that required for successive draws of a shell with stepped diameters, in which the metal is required to flow, without danger of rupture or excessive thinning, between the several steps.

Note, especially, the gradual change from curves to sharp corners as the forming progresses, and that once the sharp bends are started, these are maintained in-line through to the final pass. Note, also, how the upper rolls encompass the turned-in bead or inverted flange, starting with Operation No. 4. Needless to say, the relative diameters of the rolls must be accurately maintained.

There is practically no limit to the shapes that can be rolled. Thus, one may roll round, square, oval, hexagonal or polygonal cross sections with equal facility, about the only limitations being that of length since the finished product cannot be readily coiled without buckling. However, the strip stock usually comes in coils, and length of the product depends entirely on length of floor space beyond the take-off or discharge end. For mass production of tubes and moldings, the method is fast and economical.

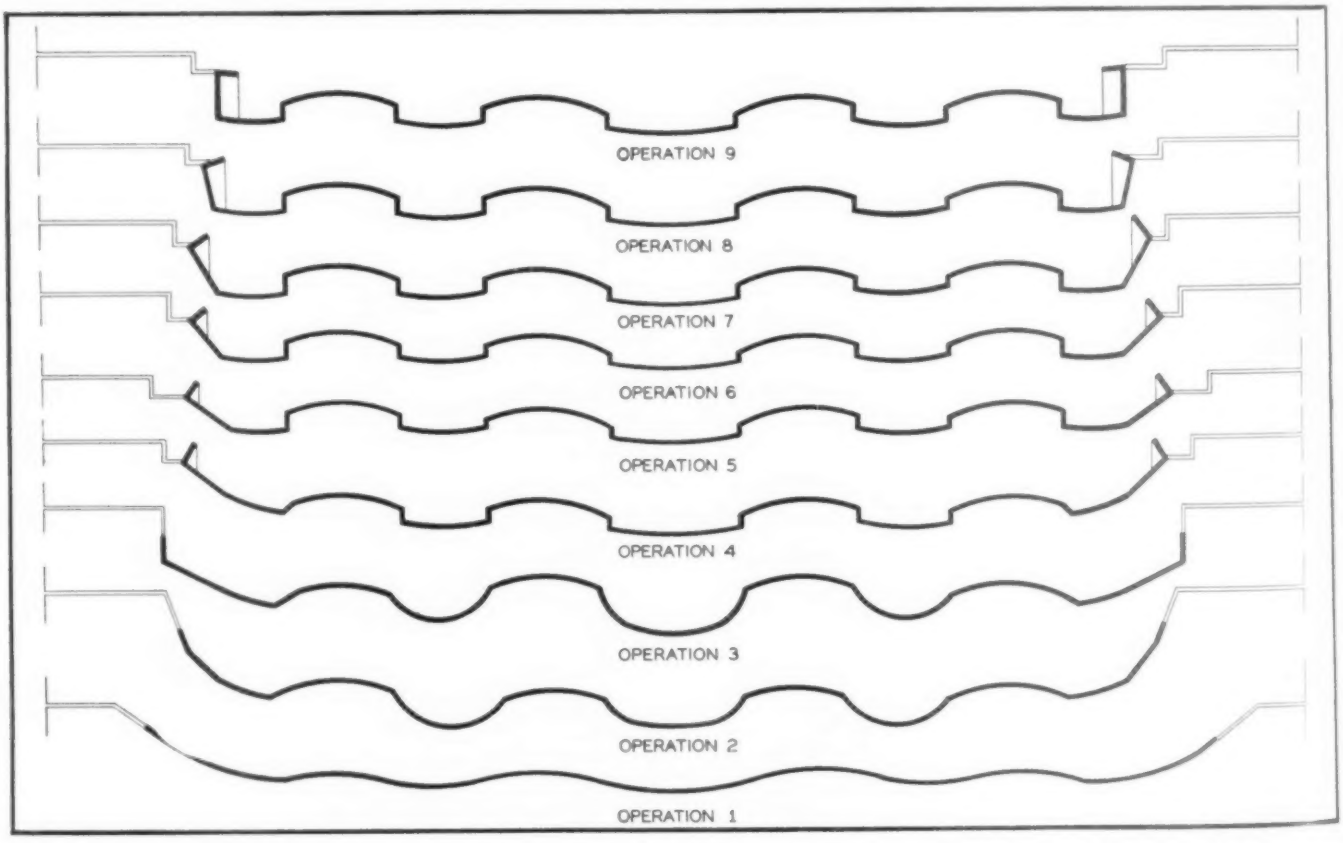


Fig. 4. showing the operation sequence required for forming wide stainless steel molding. Note how the turned-in bead is supported by the rolls for each pass. The blank size of the strip is 7$\frac{37}{64}$ in., stock thickness 0.018 in.

By J. W. Lengbridge

34-9200

Punch Press Tools for Cutting

Installment No. 12 of a Series on the Theory and Practice of Pressing Aluminum

Fundamentals of Press Cutting

OF ALL PRESSED metal operations, shearing is perhaps the most common and, in general, the least difficult. Included in this group are such operations as blanking, piercing, notching, slitting and shaving, in all of which the metal is stressed in shear between two cutting edges until a fracture occurs. The tools used usually consist of a punch, or moving member, and a die or stationary member. The former is attached to the press ram, and the latter clamped to the bolster plate. The punch must enter the die for a short distance in order to push the cutting free.

When applied load in a tensile test exceeds the yield strength of the material, deformation effects a reduction in area at some part of the test specimen. With further loading, fractures occur in this reduced or necked area, as shown at A, Fig. 104. Similarly, in a cutting operation, the section area is reduced when the metal is stressed beyond its elastic limit, and fractures occur where the load is concentrated, as shown at B.

The metal to be cut is placed on the die, and the moving punch cuts through the stock in one rapid action. In the act of shearing or cutting, a movement of metal occurs which may be divided into three fundamental steps, as described in the caption, Fig. 105. In turn, these steps result in three conditions—illustrated in Figs. 106 and 107—which are characteristic of almost any die-cut edge.

Clearance and Controlling Factors

Cutting operations are less affected by variables than drawing operations, and the controlling factors are fewer in number. However, three essential requirements must be met in order to obtain good cuts with minimum loads: (1) The clearance must be suitable for the thickness, type and temper of the material being cut; (2) the tooling must maintain the cutting edges in correct alignment; and (3) the edges must be kept keen, and the work lubricated.

A punch two inches in diameter cutting into a 2.01 in. die would have a space of 0.005 in. all round if the punch were centrally located in the die. The size difference between the punch and die diameters would be 0.01 in. If, due to careless die making or tool setting, the punch were 0.003 in. off center, the space on one side would be 0.002 in. and on the other 0.008 in. The relative position of the cutting edges would not be uniform, thus providing too little clearance on one side and too much on the other, yet, the size difference would still be 0.01 in. In this discussion, the cutting clearance will be considered only in terms of the relative position of adjacent cutting edges as shown in Fig. 108.

Correct clearance will produce the best cut edges with minimum load. Excessive clearance will cause burred edges, distortion of the material and a pinched-off rather than a cut edge. Insufficient clearance will result in secondary or triple shearing as well as high cutting loads. The plastic deformation, the penetration, and the fracture are all affected by the clearance allowed between the cutting edges; however, the same clearance on different alloys of the same metal do not always result in the same characteristics. For instance, the cut edge of two blanks of aluminum—one Alcan 2S-H the other Alcan 17S-T—will not have the same characteristics, even when cut in the same tool and under the same conditions of clearance. These phenomena will be described more fully later; for now, the reader is referred to Figs. 109, 110, 111 and 112, with explanatory captions.

Effect of Clearance on Size

As the clearance is usually made proportional to the stock thickness, the clearance value may be quite a substantial figure when cutting thick material. In most cuts, the edge is slightly tapered by an amount equal to the clearance. When blanking a hole in a piece of metal, for instance, the diameter of the hole on that face on which the punch enters will be the same as the punch diameter. The diameter of the hole on the opposite face of the material will be equal to the size of the die opening. A 2 in. diameter punch cutting 0.10 in. material with 10 percent clearance will produce a hole 2.00 in. on one face, and 2.020 in. on the other, because the punch would be 2.00 in. and the die 2.020 in. in diameter.

If a 2 in. hole were required, that arrangement of clearance would be satisfactory. If, however, a 2 in. diameter blank were required, the above punch and die would both be too large. The punch would have to be made 1.980 in. in diameter and the die 2.000 in. in diameter, so that the largest diameter on the blanked piece would be 2 inches.

For blanks of any given size, the die is first made to size and the punch is made smaller. If holes of a given size are required, the punch is made to size and the die is made larger. This is shown in Fig. 113, in which A illustrates the size arrangement to use when cutting blanks of a given size; and B the arrangement when piercing holes of a given size. In each case, the clearance is indicated by the letter "c."

There seems to be no definite data for the amount of clearance necessary for any given cut; however authorities agree that it should vary in direct proportion to the thickness of the metal being cut. One old rule-of-thumb-method specifies 0.10t for soft metals—such as brass and copper—and 0.125t for harder metals. Yet another specifies 0.05t and 0.08t, which is about one-half of the first rule—easily due to the difference in definition previously mentioned. Possibly because it tends to reduce the cutting loads, greater clearance is usually allowed for hard metals.

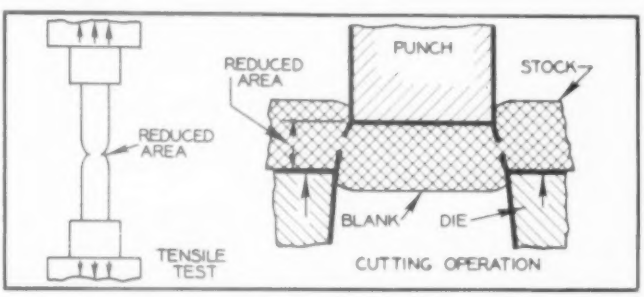


Fig. 104, showing effects of fractures occurring in reduced areas. For instance, when the applied load in a tensile test on a test specimen—A—exceeds the yield point of the metal, deformation occurs in the form of a reduction in area. Further loading causes fracture. Similarly, when metal is stressed beyond its elastic limit in a cutting operation, the section area is reduced, as shown at B, and fractures occur where the load is concentrated.

These articles are a collaboration between the author, Mr. Lengbridge, and Aluminum Laboratories, Ltd., of Kingston, Ontario.

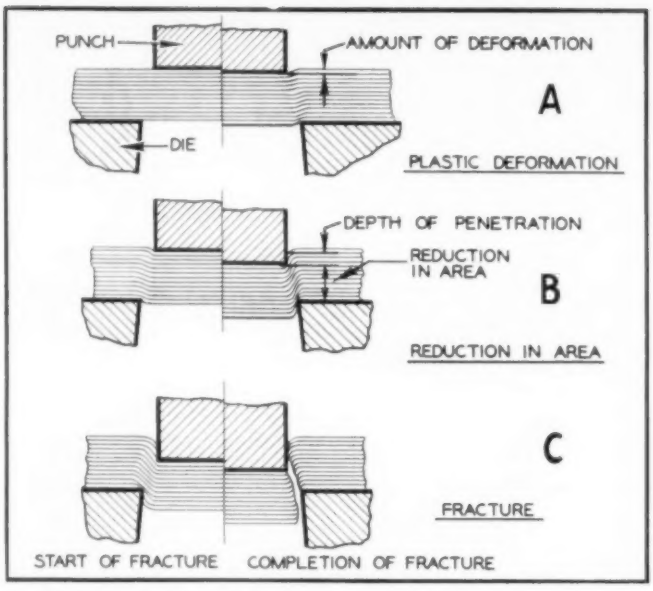
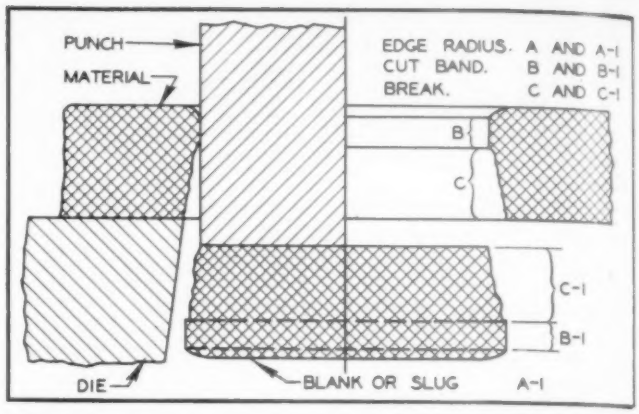


Fig. 105, at left above, shows the three fundamental steps in shearing or cutting. The pressure applied by the punch on the metal tends to deform it into the die opening. When the elastic limit is exceeded by further loading, a portion of the material will be forced into the die opening in the form of an embossed pad on the lower face of the material and a corresponding depression on the upper face, as indicated at A. As the load is further increased, the punch will penetrate the metal to a certain depth and force an equal portion of metal thickness into the die, as indicated at B. This penetration occurs before fracture starts and reduced the cross section area of metal through which the cut is being made. Fractures will start in the reduced area at both upper and lower cutting edges, as indicated by C, Fig. 105. In the clearance is suitable for the material being cut, these fractures will spread toward each other and eventually meet, causing complete separation. Further travel of the punch will carry the cut portion through the stock and into the die opening.



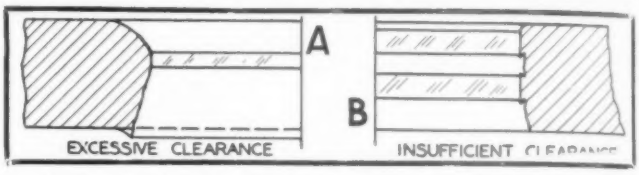


Fig. 106, upper right, shows characteristics of the cut edge on stock and blank with normal clearance. In the edge radius, the upper corner of the cut edge of the stock—indicated by A—and the lower corner of the blank—indicated by A-1—will have a radius where the punch and die edges, respectively, make contact with the material. This is because of the plastic deformation taking place. This radius will be more pronounced when cutting soft metals, for reasons previously stated. Excessive clearance will also cause a large radius at these corners, as well as a burr on opposite corners. The greater the clearance, the closer the conditions approaching forming instead of cutting, as shown at A, Fig. 107.

For the cut band, the punch will penetrate the material for a short distance before fracture occurs, and will force an equal portion of material into the die opening. That portion of the thickness so penetrated will be highly burnished, appearing on the cut edge as a bright band around the entire contour of the cut adjacent to the edge radius—indicated at B and B-1. When the cutting clearance is not sufficient, addition bands of metal must be cut before complete separation is accomplished, as shown at B, Fig. 107. With regard to break—and since this area is broken away rather than cut, when correct cutting clearance is used, the material below the cut will be rough on both the stock and the slug. With correct clearance, the angle of fracture will permit a clear break below the cut band, due to the upper and lower fractures extending toward one another. Excessive clearance will result in a tapered cut edge since, for any cutting operation, that side of the material which the punch enters will, after cutting, be the same size as the die opening. Excessive and insufficient clearance is shown in Fig. 107, at lower right.

Because blanking pressure decreases as the clearance increases, it is advisable to provide ample clearance on large groups of closely spaced punches. If flatness of the blank is important, it must be remembered that bowing or distortion increases with the clearance. If the edge condition is important, insufficient clearance will produce the poorest edge and will also cause secondary shearing.

Specific Data on Clearance for Aluminum

Table 9 may be used as a general guide in selecting clearance for the metals shown. The data on copper, brass and steel is approximate, but that for use on aluminum is based on the results of actual tests.

TABLE 9—CUTTING CLEARANCES

Metal	Soft	Medium	Hard
Aluminum	10%	12%	13%
Copper	6	7	8
Brass	5	6	7
Steel	4	5	6

Eight lots of metal of each temper were tested, varying in thickness from 0.025 in. to 0.200 in. The clearance values used ranged from 75 to 50 percent, and the values giving the best results were 10 percent for Alcan 2S-0, 12 percent for Alcan 2S-H, and 13 percent for Alcan 17S-T. One die was used with six different punches, and cuts were made with each punch on the eight different thicknesses of each grade of metal. This made possible a wide range of clearance values from which to select suitable standards. Forty-eight samples from each grade of metal were cut, or 144 tests in all.

While it was possible to obtain cuts under conditions of minimum clearance on the thickest samples; minimum to normal on the medium thick samples, and normal to maximum on the thinnest samples, it was not possible—with only six punches—to obtain minimum to maximum clearance conditions on all thicknesses. The results obtained in the various clearance groups follow in Table 10.

TABLE 10—CLEARANCE GROUPS

Clearance	Samples tested	Good cuts
Up to 5%	68	None
5 to 10 %	43	30%
10 to 20%	21	90%
20% and up	12	None

The cut edge of each sample was examined carefully after cutting, and graded as to quality of cut, appearance and other characteristics. The classifications, together with the clearance condition under which each occurred in the three types of metal tested, are shown in Table 11. The clearance range within which a high percentage of good cuts were obtained may be judged from Table 12, in which the samples are divided into four general clearance conditions.

The best edge condition was obtained on Alcan 2S-O on cuts made with a clearance ranging from 7 to 16 percent, the majority being close to 10 percent. The results of all tests of this metal under all clearance conditions is shown in Fig. 114.

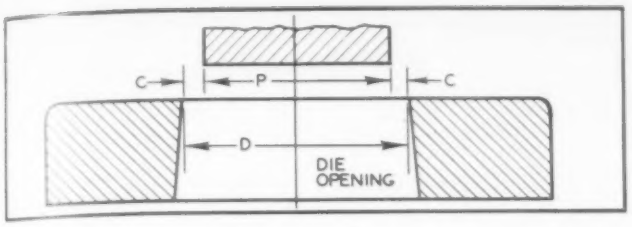


Fig. 108, a diagram defining clearance, in which P = punch size; D = die size; and C = clearance. The cutting edges are considered only in terms of the relative position of adjacent cutting edges. It is expressed as a percentage of the metal thickness, defined as follows: "The clearance on cutting tools is the space between the adjacent cutting edges of the punch and the die, at any point on the periphery of the tool when the punch is centrally located in the die."

TABLE 11—EDGE VARIATION WITH CLEARANCE

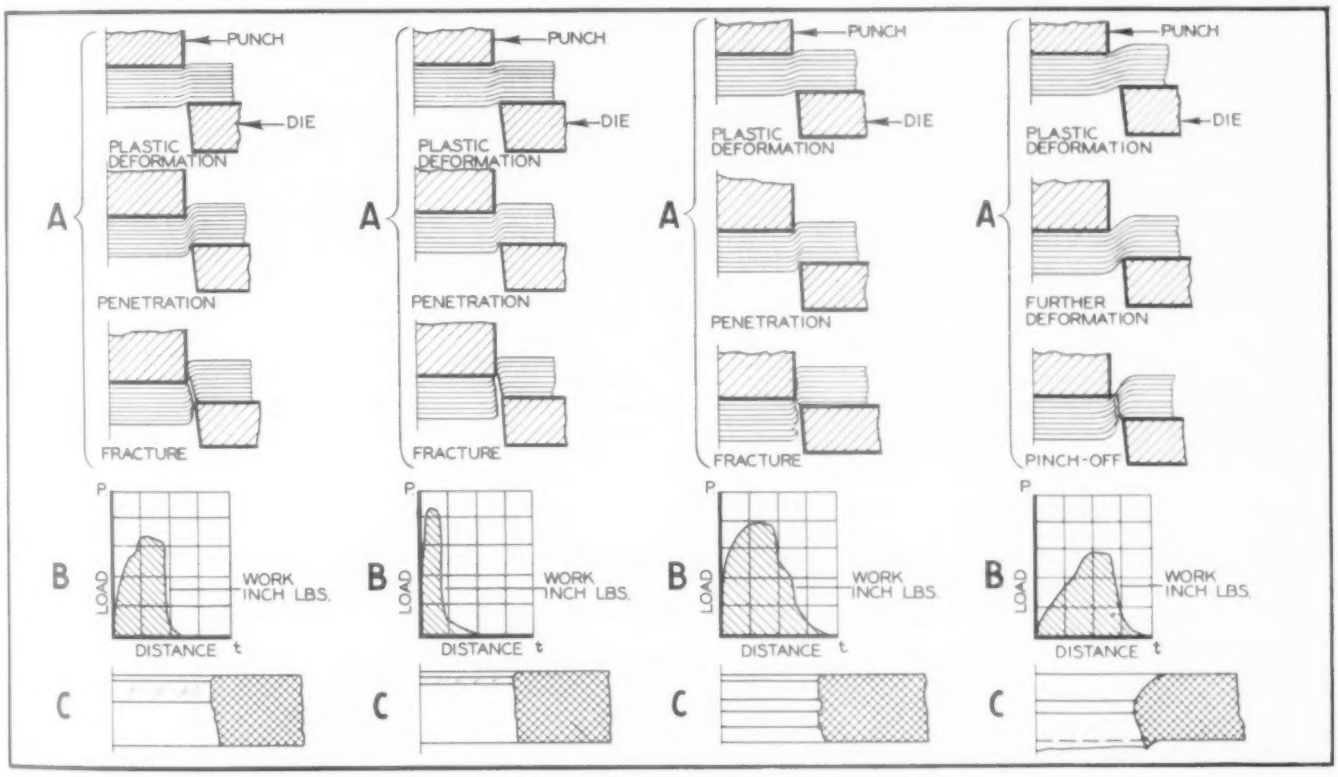
Grade No.	Edge Classification	CLEARANCE RANGE Alcan 28-O	Alcan 28-H	Alcan 17S-T
5	Triple cut	1½% or less	2% or less	.....
	Large spot, burnished	.....	.....	2½% or less
4	Secondary cut	1½ - 3%	2 - 4%	.....
	Small spot, burnished	.....	.....	3 - 6%
3	Rough cut	4 - 5½%	4 - 6½%	5 - 7½%
2	Fair cut	5 - 7%	7 - 8%	8 - 10%
1	Good cut	7½ - 15%	8 - 18%	11 - 20%
6	Pinched off	25% and up	25% and up	20% and up

and photographs of the cut edge of samples of cuts under various clearance conditions are shown in Fig. 115, with data in the caption.

On Alcan 28-H, the appearance of the cut edge obtained under various clearance conditions was about the same as the edge obtained on 28-O under similar clearance conditions. The range under which good cuts were obtained was also about the same. Good cuts were obtained with clearance ranging from 8 to 17½%, most of the good examples being within a clearance group of 13%. The distortion to the samples when cut with excessive clearance was noticeably less than on the Alcan 28-O samples, possibly due to the higher strength of the alloy in question.

The results obtained on both metals—shown in Fig. 115, A, B and C—are typical. On the basis of the results, it is reasonable to assume that a nominal clearance of 11% of the metal thickness would be satisfactory for Alcan 28-H alloy and that the range could be from 9 to 13%. The chart, Fig. 116, shows the type of cut obtained on all samples tested of this alloy.

On Alcan 17S-T, the edge appearance on samples cut with insufficient clearance differs entirely from either of the other two alloys tested. The triple and double rings of metal evident on the non-heat-treatable alloys are clearly defined on all samples of these metals cut with less than



Figs. 109, 110, 111 and 112, showing respectively the effect of correct clearance on soft and hard metals, and the effects of insufficient and excessive clearance. In each illustration, A represents the cutting cycle—plastic deformation, penetration and fracture; B the load curve; and C the edge condition, the latter a typical cross section through the cut. The load curve B is hypothetical because no facilities are available for obtaining exact data in tests made on production equipment. The resistance to deformation is indicated by a rise in the load at the beginning of the operation, increasing sharply when the punch penetrates the metal. The punch moving through the stock would cause these fractures to meet, and the load would drop to zero when separation occurred. It should be noted that the cutting cycle is complete when the punch has moved through about 1/3 of the stock thickness, typical phenomena when cutting comparatively soft metals with a correct clearance, as assumed in the diagram, Fig. 109. On hard metal under conditions of correct clearance, the appearance of the cut edge would differ, the load would be higher, but the cutting cycle would be accomplished with a shorter movement of the punch through the stock than would be necessary with soft metal. See Fig. 110. Excessive clearance, on either soft or hard metal would result in burring of the edge and on soft metal considerable distortion, as indicated in Fig. 111. In sufficient clearance, as shown in Fig. 112, is the worst condition both from the standpoint of quality and the loading required. The clearance determines the angle at which the fractures occur, and if this angle is such that the upper and lower fractures do not move toward each other, they will not meet. This condition leaves additional bands of metal which must be cut before separation takes place. Because of the condition stated, the cutting load must be applied through a longer time period. In extreme cases, the punch would have to move through the full thickness of the material before separation would occur, as indicated by the curve in Fig. 112. A cross section through the cut would show two or more cut bands as indicated at C. This condition is known as double, triple—and so on—shear, and is the usual indication of insufficient clearance on the non-heat-treatable alloys of aluminum.

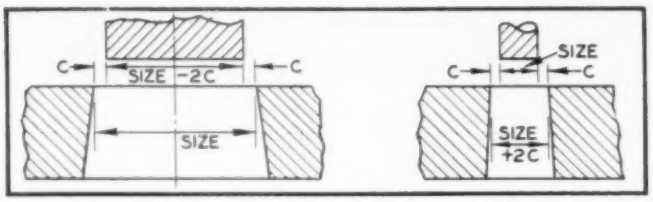


Fig. 113. Diagram showing when to add clearance to the die and when to deduct from the punch. The letter "c" denotes clearance between punch and die, the relative sizes of both of which are indicated. At A, which shows clearance for blanks of a given size, make die to size and the punch smaller; at B, which shows clearance for holes of a given size, make punch to size and the die larger.

TABLE 12—CLEARANCE RANGE FOR GOOD CUTS

ALLOY	CLEARANCE RANGE	% GOOD CUTS
(1) Insufficient clearance	(62 samples in grades 4 & 5)	
Alcan 2S-O	0 - 3½%	None
Alcan 2S-H	0 - 4%	None
Alcan 17S-T	0 - 6%	None
(2) Minimum clearance (to produce passable cuts)	(38 samples in grades 2 & 3)	
Alcan 2S-O	3½ - 7%	12
Alcan 2S-H	4 - 8%	12
Alcan 17S-T	6 - 10%	12
(3) Normal clearance	(25 samples in grade 1)	
Alcan 2S-O	7 - 16%	100
Alcan 2S-H	8 - 17½%	100
Alcan 17S-T	10 - 18%	100
(4) Excessive clearance	(19 samples in grade 6)	
Alcan 2S-O	16 - 50%	17
Alcan 2S-H	17½ - 50%	20
Alcan 17S-T	18 - 50%	20

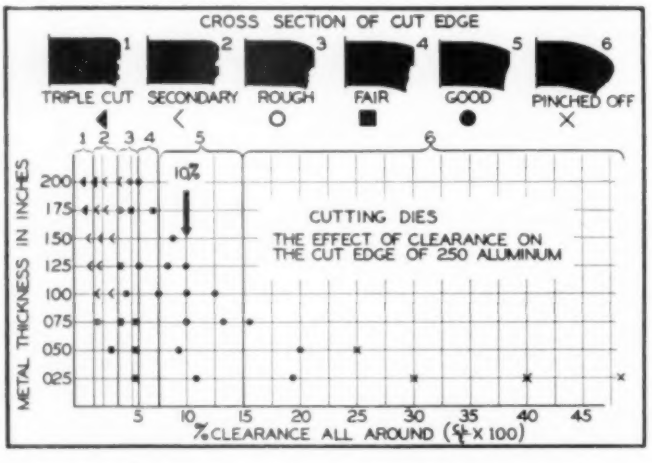


Fig. 114, showing results of tests on Alcan 2S-0 under all clearance conditions.

3½% clearance on Alcan 2S-O, and 4½% clearance on Alcan 2S-H. The cut edges of all Alcan 17S-T samples cut with less than 5½% clearance had an irregular burnished appearance in some areas, and was rough on other areas.

On samples cut with less than 2½% clearance, the burnished areas were more or less continuous and, as the clearance was increased, these burnished areas became smaller and appeared as irregular shaped islands of metal above a rough background. The clearance range within which good cuts were obtained was between 10% and 18%, most of them being close to the 13% group. The results of all tests on Alcan 17S-T are shown in Fig. 117.

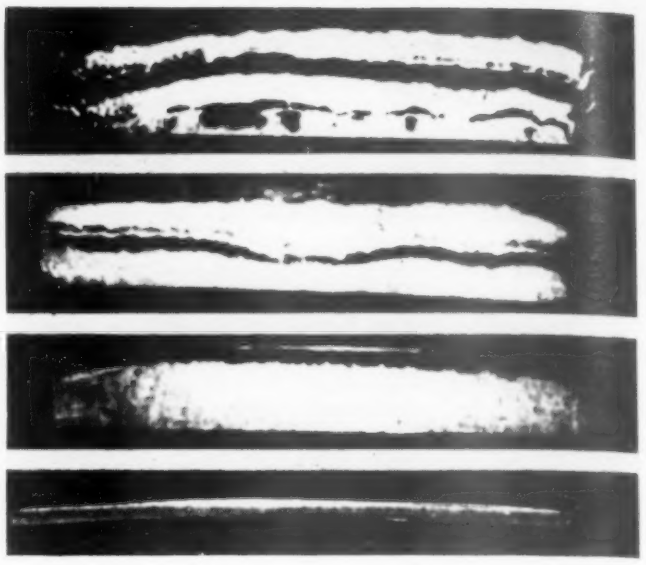


Fig. 115, photographs of cut edges of sample cuts on Alcan 2S-0 under various clearance conditions. At A, a triple cut with clearance 1¼%. Clearance insufficient. At B, a double cut with a clearance of 3¾%. Clearance not sufficient. At C, a good cut obtained with clearance of 12%. Clearance correct for this metal. At D, distortion as a result of a 50% clearance. Clearance plainly excessive. Fig. 115 C is typical of best results obtained on all the Alcan 2S-0 alloy tested, and 80% of these samples classed as good cuts were made with a clearance between 8 and 12%. On the basis of the results obtained in the test, it is reasonable to assume that a nominal clearance of 10% of the metal thickness would be satisfactory for the alloy in question, and that this value would vary from 8 to 12% and still produce satisfactory cut edges.

Whether the burnished appearance noted on Alcan 17S-T when cut under conditions of insufficient clearance is common to other heat-treatable alloys of aluminum, remains to be seen. A possible explanation may be the abrasion occuring after separation has taken place and the slug is being pushed through the metal. The smaller the clearance, the greater would be the friction between the two edges, and the greater the area which would become burnished. On the basis of the results obtained in the test, it is reasonable to assume that a nominal clearance of 13% of the total thickness would be satisfactory for Alcan 17S-T metal, and that any clearance between 10 and 18% would be satisfactory.

Installment No. 13 will follow in May issue, THE TOOL ENGINEER.

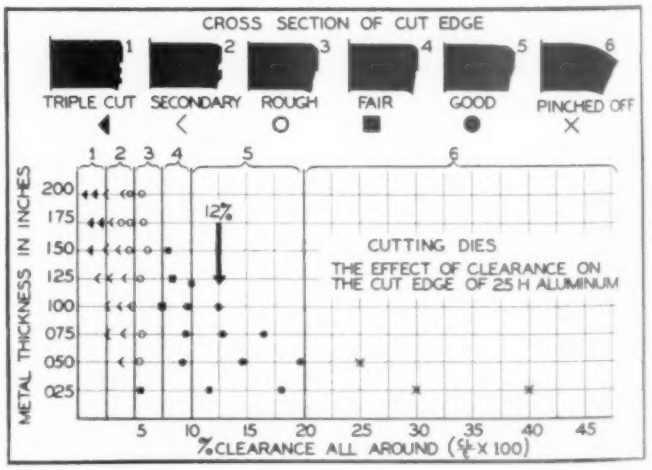
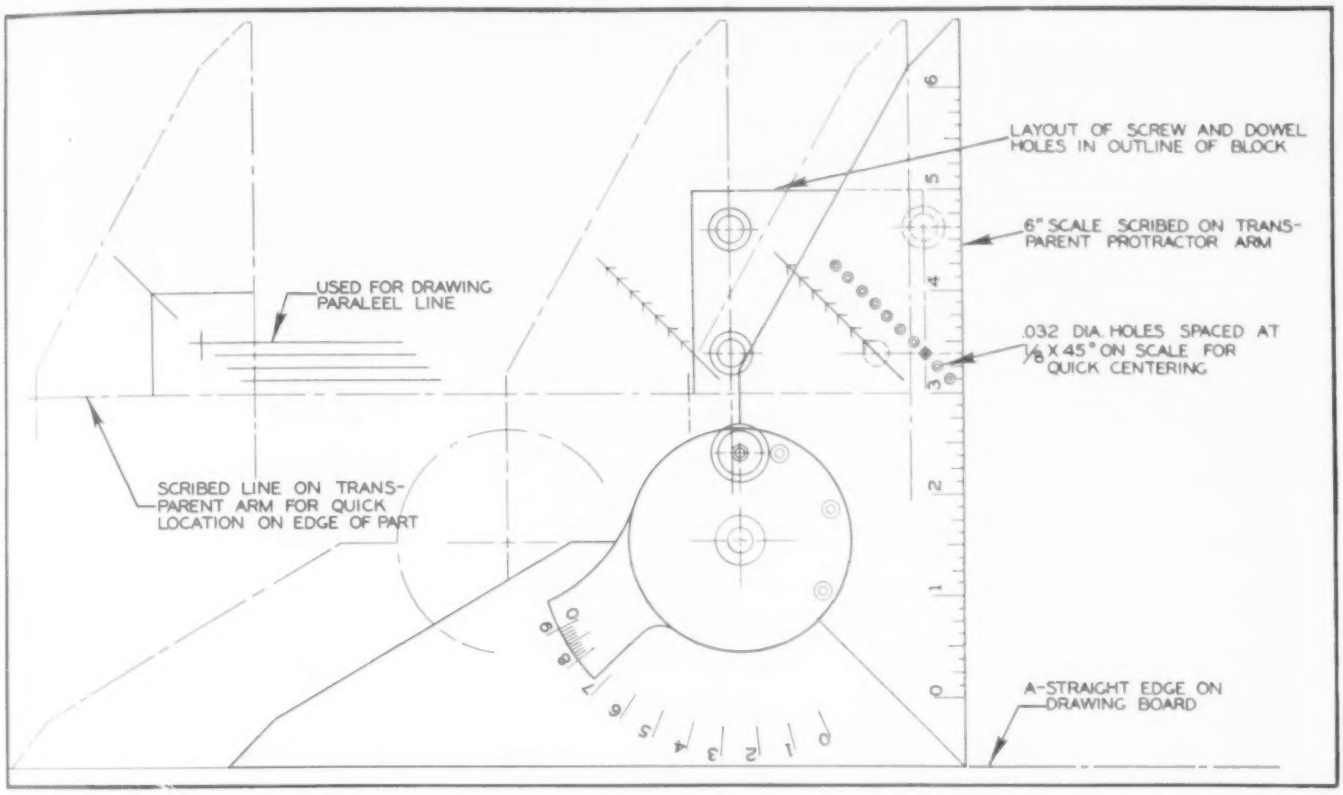


Fig. 116 shows the type of cut obtained on all samples tested of 2S-H Alcan alloy.

GADGETS

Drawing Parallel Lines and Detail Layout



The addition of a scribed line and a series of holes to a protractor greatly facilitates layout in tool and die designing.

The addition of holes and a scribed line, plus a scale on the edge of protractor arm, increases its use in tool and die designing. With the protractor set at 90°, any hole can be used for drawing parallel lines to the straight edge—A—and at a desired width. The scribed scale on the edge is used for quick layout and is convenient in angular work, especially tool and die detailing.

Holes established on the 45° angle, as shown in the sketch, provide quick means of picking center points for screw and dowel layout. Place the protractor on the edge of a detail with scribed line "B," having opposite protractor arm in contact with the table straight edge and spot the desired location with the pencil point. This method is accurate and takes less time by reducing the need to use other drafting equipment.

A. J. Pangburn
Johnson City, New York

Guard for Paper Cutter



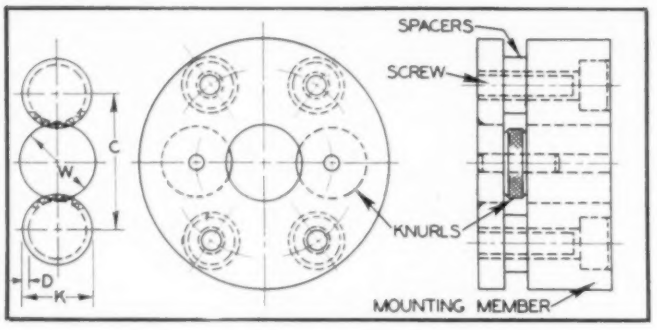
A simple guard, installed on a paper cutter, prevents serious injury to if not complete amputation of fingers.

While the writer claims nothing particularly outstanding for the paper cutter guard illustrated, it is nevertheless simple and entirely safe and prevents serious injury to if not complete amputation of fingers. As may be seen, construction is simple and the guard can be installed on any conventional paper cutter without in any way interfering with its operation.

E. Guilbert, Safety Director,
Republic Drill & Tool Co., Chicago

The Tool Engineer pays regular page rates for accepted contributions to these pages, with a minimum of $5.00 for each item.

A Simple Knurling Head



Provided with an adaptor, the knurling tool shown may be fitted directly to the tailstock spindle of an engine lathe, or to the turret of turret lathes or screw machines.

A rugged knurling tool can be easily and inexpensively built to suit special jobs. By mounting on an adaptor—not shown—it can be made to fit directly to the tailstock spindle of an engine lathe, or to the cross slide; or, it can be adapted to a turret lathe or screw machine.

Essentially, the tool consists of two discs, or plates, between which the knurling rolls are sandwiched. Spacers between the plates are made about 0.005 in. thicker than the knurls, for free running of the latter. Screws through the spacers hold the components together, and line-reamed holes carry the pins on which the knurls rotate.

The most important consideration is the location of the holes for the pins on which the knurls turn. The depth of the knurl tooth determines the center distance between the pins. The tooth depth should be deducted from the total of the work O.D. and the knurl O.D. to obtain the true center distance. This can be established by the following simple formula:

$$(W + K) - D = C$$

In which C = knurl pin center distance; W = work diameter; K = knurl diameter; and D = depth of tooth.

Since it is the nature of knurling that the amount of penetration equals the amount of outward upset, the factor D in the formula will provide perfect penetration for producing a practically perfect knurled finish. In this regard, however, cognizance must be taken of the tolerance variation of the diameter of the work being knurled, or the quality of the knurl desired.

Arthur R. Christensen
Lockport, N. Y.

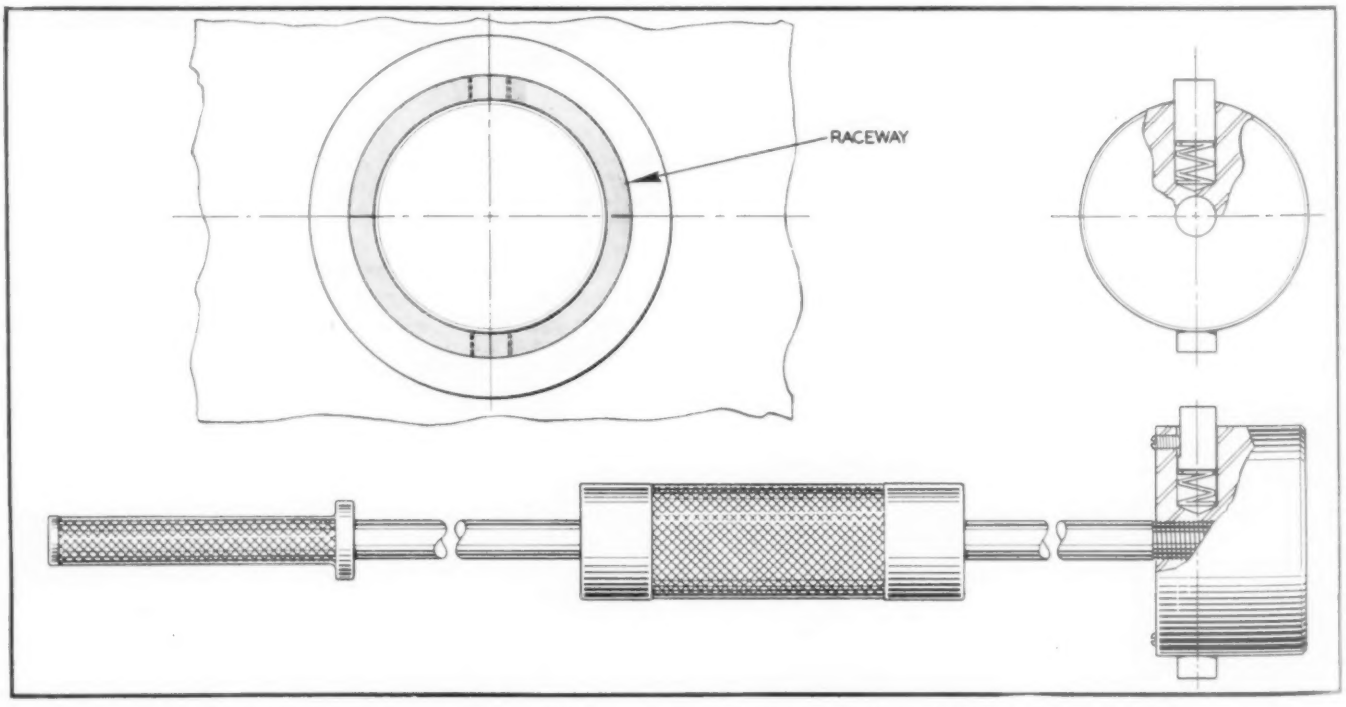
Tool to Remove Ball Bearing Races

To operate, the head is inserted in the bore of the raceway until the pins engage the holes. The knurled sleeve is then moved sharply along the rod, striking against the head of the rod much after the manner of a hammer blow. Repeated blows will withdraw the raceway from the bore without damage to the bore.

As a modification, the rod may be threaded both ends and the races pulled out by tightening on a nut; this, however, is only necessary in the event that the raceways are pressed in too tightly to be removed by the comparatively light hammer blows effected by the sleeve. The tool may also be used to remove plain bearings having opposed holes.

Ball bearing races, of the type provided with two holes as shown in the view at upper left, can be readily removed from blind bores with a tool of the type shown. The tool consists of a head having opposed spring-actuated pins, and a threaded rod over which is fitted a knurled sleeve. The heads are made in diameters to suit the bearing raceway, and the pins, which may be either stepped or straight to suit the diameter of the opposed holes, are retained by means of set screws. The springs should be made light for easy retraction.

Robert Mawson,
Providence, R. I.



Ball bearing races may be removed from blind bores by hammer impact of the sleeve striking the shoulder of the rod.

TOOL ENGINEERING DATA

NUMBER FOUR

Common Machining Difficulties and Their Correction

I—SINGLE POINT, FLAT AND CIRCULAR FORMING TOOLS

TYPE OF TROUBLE	PROBABLE CAUSE	SUGGESTIONS FOR CORRECTION
Breakage	Excessive feed	Reduce feed rate to a point where the tool will stand up under the work pressure or strengthen the tool by design revision.
	Tool deflection	Reduce overhand. Increase tool support rigidity.
	Excessive vibration	Keep machine tool, tool holders, work fixtures, etc., in first class condition. Reduce relief angles to minimum required. Follow suggestions for correcting for tool deflection.
	Clamping difficulty	Make sure that methods of holding the tool do not induce stresses causing breakage under cut.
	Improper resharpening	Check resharpening methods to make sure that tool is not cracked by improper resharpening.
	Dull tool	Do not run tool past the time at which it needs resharpening.
Chipping of Cutting Edge	Excessive feed	Reduce feed rate or redesign tool to strengthen cutting edge. Possibly use a tougher tool material.
	Improperly ground chip breakers or clearances	Avoid on-the-job additions of chip breakers or curlers. Make sure that specified clearances are maintained or reduce the clearances if excessive.
	Excessive vibration	Keep machine tool, tool holders, work fixtures, etc., in first class condition. Reduce relief angles to minimum required.
	Excessive relief	Do not exceed recommended amounts of relief when resharpening.
Burning of Cutting Edge	Excessive speed	Reduce surface speed to a point at which the tool will stand up. Possibly use a tool material of higher red hardness.
	Hard work material	Check hardness of work material to keep it within range of machinability under the operating conditions.
	Inadequate cutting fluid	Increase flow of cutting fluid or improve direction of flow to cool cutting edge in the cut. Consider use of cutting fluid with better cooling properties with temperature maintained at 70° to 80° F.
Cratering	Excessive speed or feed or both eroding top of tool	Reduce speed or feed to eliminate excessive cratering. Possibly use a more abrasion-resistant tool material.
	Insufficient rake angle	Increase rake angles to reduce friction of chip against tool.
Rough Finish	Too high feed rate	Reduce feed rate.
	Too low surface speed	Increase surface speed but avoid reaching speed at which tool burns.
	Dull tool	Do not run tool past the time at which it needs resharpening.
	Improper cutting fluid	Change to cutting fluid recommended for finish on particular work material.
Chip Clogging	Chips too long	Use separate chip breakers or grind chip breaker or curler into tool.
	Insufficient cutting fluid	Increase pressure of cutting fluid or so direct flow that chips are washed away.
Rubbing	Too little relief or clearance	Increase relief or clearance until tool does not drag and rub in cut. Do not weaken tool by exceeding necessary relief.
	Tool cocked in holder	Make sure that tool is held in correct relation to the work.

—Courtesy Gorham Tool Company

TOOL ENGINEERING DATA NUMBER FOUR

Common Machining Difficulties and Their Correction

II—MULTIPLE POINT ROTATING TOOLS

TYPE OF TROUBLE	PROBABLE CAUSE	SUGGESTIONS FOR CORRECTION
Breakage	Excessive feed	Reduce feed to a point where weakest cross section of tool will withstand the required torque and thrust.
	Too many teeth engaged in cut at same time	Reduce number of teeth in cutter or strengthen cross section to carry load.
	Chip packing	Reduce number of teeth in cutter or increase chip wells by revising tooth shape.
	Feeding without uniform rotation of tool	On arbor cutters, use well fitting key extending into collars on both sides. On shank type cutters, make sure driving mechanism is adequate.
	Dull cutter	Do not run tool past the time at which it needs resharpening.
	Improper resharpening	Check resharpening methods to make sure that tool is not cracked by improper resharpening.
Chipping of Cutting Edge	Excessive feed	Reduce feed rate or redesign tooth shape to strengthen cutting edge. Possibly use a tougher tool material.
	Excessive vibration	Keep machine tool, arbors, supports, work fixtures, etc., in first class condition. Use an arbor of sufficient size to overcome torsional vibration.
	Excessive relief	Do not exceed recommended amounts of relief when resharpening.
Burning of Cutting Edge	Excessive speed	Reduce surface speed to a point at which the tool will stand up. Possibly use a tool material of higher red hardness.
	Hard work material	Check hardness of work material to keep it within range of machinability under the operating conditions.
	Inadequate cutting fluid	Increase flow of cutting fluid or improve direction of flow to cool cutting edge in the cut. Consider use of cutting fluid with better cooling properties.
Cratering	Excessive speed or feed or both eroding face of tooth	Reduce speed or feed to eliminate excessive cratering. Possibly use a more abrasion-resistant tool material or apply a case treatment to present tools.
	Insufficient rake angles	Increae rake angles to reduce friction of chip against tooth face.
Rough Finish	Too high feed rate	Reduce feed rate.
	Too low surface speed	Increase surface speed but avoid excessive speed.
	Dull tool	Do not run tool past the time at which it needs resharpening.
	Improper cutting fluid	Change to cutting fluid recommended for finish on particular work material.
	Milling against the feed	If conditions warrant, use in-cut or climb milling.
Chip Clogging	Insufficient chip room	Reduce number of teeth or revise shape of tooth to provide ample chip room.
	Insufficient cutting fluid	Increase pressure of cutting fluid or so direct flow that chips are washed out of teeth or flutes.
	Tool magnetized	Make sure that the tool is demagnetized after being held on a magnetic chuck.
Rubbing	Insufficient concave	Increase concave to avoid rubbing.
	Work closing in on cutter	Keep work piece cool or clamp so that it cannot shift into cutter.
	Axis of tool out of relation to feed travel	Check machine tool to make sure that it is properly lined up.



Douglas, First Canadian to Head A.S.T.E.

Board Elects Officers, Sets Handbook Price, Accepts New York Convention Bid, House of Delegates Names Directors, at March Annual Meeting in Pittsburgh

ROBERT B. DOUGLAS, president of Godscroft Industries, Ltd., Montreal, Que., was elected president of the American Society of Tool Engineers by the board of directors at their annual meeting in Pittsburgh, March 11. Mr. Douglas is the first member outside the United States to receive this honor.

Other officers elected to serve with Mr. Douglas are: Herbert L. Tigges, first vice-president, executive vice-president of Baker Bros., Inc., Toledo, Ohio. Mr. Tigges is also an advisor and consultant for the manufacturing division of the National Security and Resources Board at Washington, a director of the National Machine Tool Builders' Assoc. and of Amtea Corp., New York City.

Jacob J. Demuth, second vice-president, general superintendent and member of executive committee, Sligo, Inc., St. Louis, Mo.; Halsey F. Owen, third vice-president, professor of industrial engineering, Purdue University, Lafayette, Ind.

William B. McClellan, sales engineer, Gairing Tool Co., Detroit, was reelected national secretary and George A. Goodwin, chief process engineer for Master Electric Co., Dayton, Ohio, was retained as national treasurer.

Earlier the same day the house of delegates, composed of chapter representatives, elected the following new members to the board of directors: Leslie B. Bellamy, district manager, Sterling Grinding Wheel Div., Cleveland Quarries, Detroit; Victor H. Ericson, vice-president and sales manager, Johnson de Vou, Inc., Worcester, Mass.; Arthur D. Lewis, owner and manager, Art Lewis Production Equipment Co., Glendale, Calif.; and Roger F. Waindle, general manager, Industrial Products Div., Elgin National Watch Co., Aurora, Ill.

Six incumbent directors were reelected. They are: Robert W. Ford, assistant sales manager, Ex-Cell-O Corp., Detroit; Harold E. Collins, chief production engineer, Hughes Tool Co., Houston, Texas; Thomas J. Donovan, Jr., president, Donovan Co., Philadelphia, Pa.; Mr. Douglas, Mr. Tigges and Mr. Demuth.

Eleventh member of the incoming board is Retiring President Irwin F. Holland, general superintendent, Small Tool and Gage Div., Pratt & Whitney, Div.

Top: The Society's new national officers were installed at the annual dinner in Pittsburgh, March 12. From left: William B. McClellan, national secretary; George A. Goodwin, national treasurer; Halsey F. Owen, third vice-president; Jacob J. Demuth, second vice-president; Herbert L. Tigges, first vice-president; and Robert B. Douglas, president. Irwin F. Holland, retiring president, administers oath of office, while Directors H. E. Collins and V. H. Ericson look on. Right: Harmon S. Hunt, a past chairman of Greater New York chapter, calls attention of ASTE officers and Pittsburgh convention committeemen to banner inviting Society to New York City



Niles-Bement-Pond Co., West Hartford, Conn.

Mr. Holland installed the national officers during the annual dinner and national membership meeting, March 12. The newly-elected directors will take office at the semi-annual meeting of the board in October.

To head national committees during his administration, President Douglas has appointed: Richard R. Linch, constitution and by-laws, of the National Distribution System, Los Angeles, Calif.; Ray Morrissey, editorial, vice-president, The Cross Co., Detroit; Jay N. Edmondson, education, professor of industrial engineering, Ohio State University, Columbus, Ohio.

Edward W. Ernst, handbook, superintendent of purchasing, Tool and Die Div., General Electric Co., Schenectady, N.Y.; Joseph A. Siegel, honor awards—judicial, sales engineer, Haberkorn Machinery Co., Detroit; Harry B. Osborn, Jr., membership, technical director, Tocco Div., Ohio Crankshaft Co., Cleveland, Ohio.

William A. Dawson, professional engineering, branch manager, F. F. Barber Machinery Co., Hamilton, Ont.; Fred J. Schmitt, program, director of sales, D. A. Stuart Oil Co., Chicago, Ill.; W. J. Gamble, public relations, partner, Gamble & Gamble, Buffalo, N.Y., and Director-Elect L. B. Bellamy, standards.

* * *

More than 500 members and guests attended the seventeenth annual meeting, March 10-12, at Hotel William Penn in Pittsburgh, to participate in technical sessions, plant tours, business meetings and other events.

Greater New York chapter invited the Society to New York City in 1951. The board accepted this bid for the annual meeting two years hence, and voted an appropriation to begin promotion of the 1950 exposition at Cleveland, March 20-24. The National Program Committee met to start work on the Montreal convention next October.

Throughout the convention members crowded around a display featuring dummies containing sample pages of the "Tool Engineers' Handbook," and galleys and page proofs of the remainder of the manual. As soon as the board had established a price of $11 per copy, ASTE'ers began placing orders for delivery upon publication this summer. At the special Society discount, members are limited to one copy for their own use. To buyers outside the Society, the publisher has set a price of $15. Sales to members will be handled by H. E. Conrad, executive secretary.

Full details of the business transactions and convention activities will be reported editorially and pictorially in the May issue.

Members crowd handbook display at Pittsburgh convention to examine contents of new tool engineering manual. Handbook Chairman Edward Ernst (third from right behind table) looks over some page proofs, while Editor Frank Wilson shows chart to Andrew Clark of Cleveland

MOVING?

Be sure to notify National Headquarters so The Tool Engineer will reach you at your new address. Write to: American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

N. E. Engineers Honor Flanders with Award

Boston, Mass.—Senator Ralph E. Flanders, retired industrialist, past president of ASME, of the National Machine Tool Builders' Association and of the Federal Reserve Bank of Boston, will receive the 1949 New England Award of the Engineering Societies of New England.

Mr. Flanders was selected for his outstanding contributions to the engineering profession, to the community and to the nation.

W. W. Young, retiring chairman of Boston chapter, ASTE, and J. X. Ryneska, a past chairman, represented their chapter on the award committee and proposed Mr. Flanders as candidate for the honor. The senator from Vermont is a member of the Twin States ASTE chapter at Springfield, Vt.

Presentation of the award will be made at the annual dinner of ESNE, April 27.

Other News in This Issue

Chapter	Page
Boston	48, 51
Buffalo-Niagara Frontier	53
Chicago	50
Columbus	50, 56
(Dallas) North Texas	55
Detroit	52, 56
Elmira	51
Flint	54
Fond du Lac	54
Fort Wayne	54
Hartford	54, 55
Houston	51
Indianapolis	50
Kansas City	50, 53
Los Angeles	49, 50
Louisville	47
Madison	49
Milwaukee	47
Montreal	47, 49
New Haven	48
New York, Greater	49
Philadelphia	57
(Poughkeepsie) Mid-Hudson	47
(Providence) Little Rhody	53
Racine	48
Richmond	48
Rochester	53
Rockford	52
(San Francisco) Golden Gate	52
South Bend	54
Springfield (Mass.)	56
(Springfield, Vt.) Twin States	53
St. Louis	51
Syracuse	55
Toledo	55
Windsor	47
Worcester	50

* * *

Coming Meetings	57
Directory of ASTE Chapter Chairmen	58
Situations Wanted	56

Chapter listings include member as well as meeting news.



Canadian Standards Com. Issues First Data Sheets

Windsor, Ont.—First mailing of ASTE data sheets, compiled by a Canadian manufacturer for distribution to Dominion members of the Society, has been announced by W. A. Thomas, chairman, Canadian National Standards Committee, Standard Machine & Tool Co., Ltd., of Windsor, supplied the sheets issued in this mailing.

A number of other Canadian manufacturers have been contacted for participation in this program. General Electric Co., Ltd., and Cowan Goodridge Co., Ltd., already have sheets in preparation.

The Canadian data sheet project was initiated as a special service to ASTE members and to industry in the provinces.

Committees Named for October Convention at Montreal

Montreal, Que.—Plans for the Society's seventeenth semi-annual meeting at Montreal next October are being formulated by the National Program Committee and Montreal chapter, Fred J. Schmitt of Chicago, national program chairman, and G. A. Rogers of Montreal, first vice-chairman, have announced. The two groups will hold their first joint meeting, April 22 and 23, at Montreal.

Theme for the convention will be "Economical Tooling for Short Run Production," a subject of prime interest to Canadian industry and to many manufacturers in the United States.

Convention dates are October 27, 28 and 29. Good attendance is expected from both sides of the border because of the combined attractions of a timely technical topic, the historic interest and fall beauty of the Montreal area, and the fascination of shopping for foreign merchandise.

Heading the various convention activities for the host chapter are: H. T. Welch, meetings and arrangements; T. C. Hill, plant tours; John Macdonald, accommodations; J. P. Harkness, registration; A. B. Chevrier, banquet; J. M. Rudel, reception; W. F. Stewart, transportation; J. P. Cloutier, tickets and forms; J. M. Davis, emergency; R. B. Seguin, entertainment; T. J. Tracey, publicity; and R. G. Gillespie, signs.

Mid-Hudson Elects Petz Chairman and Alternate

Poughkeepsie, N. Y.—Joseph L. Petz was elected chairman of Mid-Hudson chapter succeeding Llewellyn H. Tenney, who was named delegate to the national convention, at a meeting held February 8. Mr. Petz was also named alternate.

Other officers elected are Ellis Thorp, first vice-chairman; Robert Sedgwick, second vice-chairman; Stanley P. Cook, secretary; and Harry Carlson, treasurer.

John L. Petz, past chairman, was chairman of the nominating committee, assisted by Ornendo Freer and Walter Stadtler.

Following the business session, Harold P. Granger, Eastern regional manager of the Bellows Co., spoke to approximately 60 members and guests present on the subject, "Controlled Air Power." Mr. Granger supplemented his talk with a sound motion picture.

Air Power Is Cheapest

Air, Mr. Granger stated, is the greatest commodity that exists today and is only beginning to come into its own. Air power has unlimited possibilities and is the cheapest source of power known. Increased use of pneumatic equipment and accessories in operating machine tools has been a major contribution to the phenomenal record of production obtained in the past eight years.

Application of air, he continued, removes the fatigue element from the operator and places it on the machine, permitting maximum production at all times. To operate efficiently, however, consideration must be given to installation and maintenance of air lines. Numerous elbows, dirty or rusty pipe and leaks reduce considerably the efficiency of air equipment.

Shown and described in the motion picture were an air motor available with either mechanically operated or electrically controlled valve, the hydro check, recommended where precision of speeds and feeds is required, air vises, collet chucks, impact and arbor presses, index tables and feeding devices.

These devices were shown in varied applications such as milling, drilling, reaming, tapping, grinding, facing and cut-off operations, clamping, deep hole and multiple drilling.

Prior to the business session, Harold E. Smith of the Internal Revenue Department discussed the income tax law.

Inspecting a lathe operation at Allis-Chalmers Manufacturing Co. are officers of Milwaukee chapter during plant tour which followed election meeting. From left: Joseph Ebner, retiring chairman; Walter Behrend, second vice-chairman; Waldemar Klein, secretary; Arthur C. Gudert, chairman; and Herbert G. Heimann, first vice-chairman



Election, Plant Visit Draw Record Attendance

Milwaukee, Wis.—A record turnout of 350 members and guests assembled February 10 at the clubhouse of the Allis-Chalmers Manufacturing Co. in West Allis, to elect officers and visit the plant.

Chairman Joseph Ebner welcomed the group and introduced Paul Butzin, nominating committee chairman. After Mr. Butzin had presented his committee's candidates, the membership elected the following chapter officers for 1949-50: Arthur Gudert, chairman; Herbert Heimann, first vice-chairman; Walter Behrend, second vice-chairman; Waldemar Klein, secretary; Eugene Anspach, treasurer; and Paul Wernicke, delegate.

Fred Bond, guest speaker, related his experiences in camp near Bear Lake in the Arctic where pitchblende is mined. Slides and a color-sound film, "The Bikini Test of the Atomic Bomb," illustrated his informative talk.

Following the business meeting and speaking program, the entire group toured the Allis-Chalmers plant.

Booker Now Chairman

Louisville, Ky.—Louisville chapter held its annual election of officers February 9 at the Horseshoe Grill.

N. H. Booker, chief tool designer of the Louisville Works of International Harvester Co., was chosen chairman for 1949. The following officers were elected to assist Mr. Booker in administering the chapter: Sauter F. Reichert, first vice-chairman; Louis Gutermuth, second vice-chairman; James R. Davis, secretary; W. David Wuest, treasurer; and John A. Black, national delegate.

Thirty-nine members were present to hear the yearly report of John A. Black, retiring chairman. He emphasized that Louisville has a 30 percent increase in membership, is in healthy financial condition, and has sponsored excellent technical sessions and speakers. Attendance at meetings has been exceptional, especially the high percentage of members represented.

Special tribute was paid to the outgoing officers for their punctuality and loyalty in attending executive meetings.

Nearly 1200 Hear Boston Educational Lecture Series

Boston, Mass.—With a total attendance of 1174 members, guests and apprentices topping all expectations, Boston chapter has completed another successful series of educational lectures. Held on consecutive Thursday evenings at Massachusetts Institute of Technology in Cambridge, the course was directed by Prof. Prescott A. Smith, chapter education chairman and member of the mechanical engineering staff at the institute.

Subject for the first session, January 20, was "Methods and Analysis," with A. James Leone, vice-president of Chelsea Clock Co., Chelsea, as technical chairman. Charles L. Sadon of the River Works, General Electric Co., Lynn, was the lecturer, assisted by John E. Gillon and Raymond Follensby, also of the River Works. Many were turned away because seating capacity limited attendance to 290.

Teaches Turning with Slides, Films

At the second meeting Stanley A. Brandenburg, vice-president and sales manager of Monarch Machine Tool Co., Sidney, Ohio, spoke on "Simple Turning and Use of Contour Turning Attachments with Single-Point Tools." His talk was illustrated with slides and motion pictures and attended by 224 members and guests. Cecil Lockwood, equipment engineer of United Shoe Machinery Corp., Beverly, was in charge.

Prof. John C. Tonkin of the University of New Hampshire presided at the February 3 lecture, featuring Edward L. Murray, sales promotion manager of Warner & Swasey Co., Cleveland, Ohio, and Wilfred J. Pender of Potter & Johnston Co., Pawtucket, R. I. They collaborated on "Multiple Tooling of Turret Lathes, Single and Multiple Spindle Automatic Machines, and Machining and Tooling of Special Setups." Slides, models and samples, exhibited to an audience of 235, demonstrated the operations discussed.

Fourth topic was "Dies—Their Design and Application." Technical Chairman Francis H. Leonard, supervisor of standards at Pneumatic Scale Corp., Quincy, presented William W. Schug, vice-president and sales manager of the V & O Press Co., Inc., Hudson, N. Y., as guest speaker. Mr. Schug's talk emphasized and illustrated blanking dies, presses and special setups. Some 225 men were present.

A symposium on "Threads and Threading" was conducted by Professor Smith at the final meeting. New thread standards were detailed and thread fabrication was described by four experts.

George F. Bickford, field engineer for Jones & Lamson Machine Co., Springfield, Vt., spoke on "Die Chasing." John A. Bradner, president of Lees, Bradner Co., Cleveland, Ohio, discussed "Thread Milling and Single-Point Chasing." "Thread Grinding" was the theme of E. V. Flanders, chief engineer of the Thread Grinding Div., Jones & Lamson; and A. Bradford Reed, president of Reed Rolled Thread Die Co., Worcester, explained thread rolling to 200 technical men.

College students and industrial apprentices were in attendance throughout the course. Manufacturers cooperated wholeheartedly in the program, publicizing the lectures and lending technical talent.

In addition to his educational activities with Boston chapter and Massachusetts Institute of Technology, Professor Smith is a member of the ASTE National Education Committee and was recently installed as second vice-chairman of his chapter.

Election Highlights Four-Feature Program

Richmond, Ind.—February meeting of Richmond chapter was crowded with important events—election of officers, choosing of delegates to the annual convention, a talk by National Secretary W. B. McClellan, and an illustrated lecture on files by Walter R. Buerckel of the Nicholson File Co.

Elected to head chapter activities for the year were: Chairman, P. C. Hermansdorfer; first vice-chairman, Pierre C. Perrine; second vice-chairman, Julius Prifogle; secretary, Raymond Brisco; and treasurer, Mervin Culbertson.

Ralph R. McKee, retiring chairman, was selected as delegate to the annual convention, with Howard H. Haworth as alternate.

Officers Installed At Ladies Night

Racine, Wis.—Installation of new chapter officers highlighted the Ladies Night meeting of Racine chapter, held March 7 at Diana Hall. Eugene Bouton, one of the organizers of the chapter and a charter member, swore in the 1949 executives.

Mr. Bouton presented a past chairman pin to William Reinhardt, Jr., retiring chairman, before administering the oath of office to: G. W. Christiansen, chairman; G. F. Tigges, first vice-chairman; C. J. Schweitzer, second vice-chairman; Harold Arndt, secretary; and John Obermeyer, treasurer. Mr. Christiansen received the chairman pin.

The ASTE group joined with the Racine Purchasing Agents Association in presenting "General Motors Previews of Progress." William Cobb and John Briley of the General Motors staff demonstrated scientific achievements such as a mercury vapor lamp smaller than a cigarette and proportionately one-fifth as brilliant as sunlight, an egg fried on a cold stove, the making of butyl rubber, and the transmission of sound on a light beam.

Harold Smith of Racine Tool & Machine Co. was toastmaster.

Metallic Arc Welding Extends Tool, Die Life

New Haven, Conn.—Patrick S. Doyen and Frank E. Kessler, field engineers for Welding Equipment and Supply Co., Detroit, Mich., told 50 New Haven chapter members of the possibilities of tool and die welding, at a meeting, February 10, in Dunham Laboratory.

The speakers collaborated in an interesting lecture concerning their highly specialized subject. They described in detail the four principal applications of tool and die welding—repairing dies, compositely fabricating dies, correcting designs, and rectifying errors.

Wartime scarcity of materials gave impetus to the process which is gaining recognition for savings in material and manhours, according to the speakers.

Importance of the practice as a salvage medium was stressed, as well as the necessity for cooperation of all concerned. Proper selection of electrodes or welding rods was emphasized.

Racine members entertained their ladies at installation night. Participating in induction ceremony were from left, front row: George Tigges, first vice-chairman; George Christiansen, chairman; William Reinhardt, Jr., retiring chairman, who received past chairman pin, and Eugene Bouton, a former chairman, who administered oath of office





Madison Marks Third Anniversary with Installation and Ladies Night

Ninety members and guests of Madison chapter saw new officers installed at the third anniversary dinner and ladies night, held March 1 at the Park Hotel. At speakers' table, from right, are: Past Chairman Fred Kessenich and Mrs. Kessenich; Treasurer Hans Heydn and Mrs. Heydn; Third Vice-Chairman George Morris and Mrs. Morris; L. A. Leifer, retiring chairman and delegate to national convention; H. E. Conrad, national executive secretary and guest speaker; Chairman Vern McFair and Mrs. McFair; First Vice-Chairman W. R. Carnes and Mrs. Carnes; Second Vice-Chairman John Piekarski and Mrs. Piekarski; Secretary Werner Schaerff and Mrs. Schaerff. Mr. Conrad conducted the installation and spoke on the accomplishments and objectives of the Society. Mr. and Mrs. Robert Wurtzel, magicians, entertained after the business and speaking programs

Giant Gears Hobbed to 0.001 Inch Concentricity

New York City—How gears, ranging from 200 x 88 in. face diameter to tiny ones used in electric clocks, are hobbed to concentricity within 0.001 in. full indicator reading was demonstrated in slides by D. W. Dudley, development department head, General Electric Co. Gear Engineering Div., before Greater New York chapter at a meeting, February 7, in Hotel New Yorker.

In his lecture Mr. Dudley discussed gearing for propeller driven ships, jet and turbo propeller aircraft engines, diesel and gas turbine locomotive engines, and instrument gearing. He described such methods of producing gears as extruding, stamping, cutting, shaving, grinding and lapping.

In discussing the 200 in. gears, Mr. Dudley stressed that there is a limit between hardness of gear obtained and consequent distortion of the involute and the tooth spacing. These gears could be heat treated to 200 Brinnell and still maintain the required accuracy; in some cases they could be treated as high as 300-500 Brinnell.

Aircraft Gears More Precise

Showing aircraft gears, the speaker pointed out that because of the higher accuracy required for the involute, tooth spacing and concentricity, some gears are finish cut, shaved, and heat treated to avoid distortion; other gears have to be finish cut, then hardened.

After hardening, the gears are finish ground. In that case hobbing is done to finish the depth of the tooth, leaving grinding stock on the flanks of the tooth only, so that grinding blends with the previously hobbed root.

Mr. Dudley illustrated methods of inspecting and checking gear teeth, including the Red Liner and Vinco dial indicator for checking tooth spacing and hardness.

Instrument gears, he stated, are either extruded or stamped, the latter being more accurate.

Small electric clock gears, hobbed by thousands on a gang of automatic machines, are scooped up with a shovel and dumped into a hopper. There they are fed to automatic machines and produced at the rate of 3000 per hour. Magnified on slides, these gears showed a high degree of uniform tooth spacing. One set of gears for a motor unit was enclosed in a tiny sealed case to keep it dustproof. When these gears fail, the whole case is replaced.

During the meeting the following chapter officers were elected: Chairman, Julius Schoen; first vice-chairman, Eugene Roth; second vice-chairman, Carl Kertesz; secretary, James L. Fitzpatrick; and treasurer, Edward Galvin.

W. H. Lentz, retiring chairman, presided over an attendance of nearly 175 members. The meeting completed a series of successful programs arranged by Julius Schoen, program chairman.

Gadget Group Tests Market for Inventions

Los Angeles, Calif.—An organization that distributes to its members $2.38 worth of gadgets for every dollar received and shows a profit was explained to Los Angeles chapter, February 10, by Don L. Davis, director of advertising and public relations for the Gadget-of-the-Month Club, Inc.

Describing "merchandising" as the "technique of mass sales," Mr. Davis cited as a common fallacy the promoting of new products on a price basis. Americans, he said, are a gadget loving people, but in order to become interested in a new product, they must feel it, see it, smell it, or have it described, before purchasing.

Since manufacturers are reluctant to invest in new, untried inventions, the gadget club tests the reception of new products by distributing 100,000 samples to members, who pay in advance not knowing what they will receive.

Having been defrauded so many times, the average consumer sends in his money philosophically and waits for results. No complaints have been registered thus far, the speaker claimed.

Chapter officers elected during the meeting are: Chairman, Gerald R. Stronks; first vice-chairman, G. J. Walkey; second vice-chairman, Wayne Ewing; secretary, Rudolf Regen; treasurer, R. H. Powroznik (re-elected); delegate, L. F. Hawes; and alternate, Anton Peck.

Slides Show Press Brake Versatile, Economical

Montreal, Que.—The largest attendance of the season, 158 members and guests, greeted A. G. Baumgartner, sales engineer of Cincinnati Shaper Co., when he addressed Montreal chapter February 10 at Canadian Legion Hall. Mr. Baumgartner's subject was "The Press Brake in Sheet Metal and Plate Work."

Slides shown during his talk illustrated all types of brake from small hand-operated bending brakes to 6000 ton machines, 40 ft long, capable of bending 8 in. hot plate.

"Expensive tooling setups are not necessary in a jobbing shop," the speaker stated as he pointed out that dies can be made from oak, maple, or cold rolled steel. His illustrations included a simple four-way die on which most jobs can be produced.

Attachments Adapt It to Other Uses

A narrow nose on the punch is necessary for proper bending, said Mr. Baumgartner as he showed how adding temporary shoulders, brackets and ribs can make this narrow punch adaptable to other press jobs. Most bends are "air bends," that is, no bottoming occurs between punch and die, and the die opening controls the inside radius of the bend.

Adaptability of the press brake was demonstrated in slides picturing its use in bending, punching and most types of punch press work. Standard die sets can be mounted in series on the brake bed; punches are attached to the brake punch which acts as the ram.

Punching is an entirely different field from bending, Mr. Baumgartner emphasized with slides of 1 in. plate being bent on a ¼ in. machine by repeated hits. Only two-thirds of the brake capacity is utilized for punching, so a 150-ton bending brake is only a 100-ton punching machine.

Even though safety guards cannot be used on a press brake, danger is slight. A friction clutch is used to stop the brake anywhere in the stroke by releasing the clutch, whereas a punch press must complete a cycle when tripped.

A. B. Chevrier introduced the speaker and G. M. Foster thanked him for his presentation.



University of Kansas Students See Casting Exhibit

Student tool engineers study exhibit of precision steel and alloy castings and ask questions following lecture and demonstration at recent meeting of Kansas University ASTE group, by Alumnus George Fraser of Crucible Steel Co.

Demonstrates Inspection By Optical Projection

Chicago, Ill.—Willis DeBoer, plant and sales manager for Engineers Specialties Div., Universal Engraving & Colorplate Co., Inc., Buffalo, N. Y., explained and demonstrated "Inspection by Optical Projection" to Chicago members attending the February chapter meeting.

Mr. DeBoer proved the optical projector to be a production tool—not just a glorified ruler. The Bausch & Lomb comparator was shown in section. Standard magnifications used are 10, 20, 25, 31¼ and 62½. When magnified 62½ times, 0.001 in. becomes 1/16 in. The Eastman Kodak 14 in. screen, he indicated, has horizontal and vertical illumination and can adjust itself quickly from one magnification to another.

Other comparators shown included Jones & Lamson, Portland, Wilder, and Stocker & Yale.

With a fixture and standard plug, the speaker checked the depth of a hole on a comparator. Among other checking operations demonstrated were: accuracy of magnification, using a standard set ball and scale; internal contours, with a tracing finger, and a watch part hole location to 0.0003 in. and hole size to 0.0002 in.

Use of a standard radius chart, grid chart, and of bridges on a chart for checking very close dimensions was shown and explained. Also exhibited were an aircraft part where inspection increased from 30 to 460 pieces per hour.

Election of officers resulted as follows: A. J. Schwister, chairman; T. C. Barber, first vice-chairman; Dale Long, second vice-chairman; and William H. Schrade, secretary.

Industrial Museum Shows Steel Through the Ages

Worcester, Mass.—Some 75 members and guests of Worcester chapter visited the plant and museum of Worcester Pressed Steel Co., March 1, and compared metal craftsmanship of the past with that of the present.

John Woodman Higgins, company president and museum founder, gave a vivid picture of the incredible patience and skill exemplified by the intricate fitting and tooling of medieval suits of armor dominating the museum halls.

But Mr. Higgins is equally proud of today's craftsman whose products are displayed in the Modern Wing. The visitors left the museum with the feeling that, although we may have lost something of the manual arts, we have gained immeasurably by the advent of the machine and its products.

Following the afternoon tour, dinner was served at Putnam & Thurston's Restaurant. Speaker at the evening technical session was Herman F. Zorn, president and general manager of the V & O Press Co., Hudson, N. Y.

His subject, "Presses Geared for Production," concerned complicated tooling and automatic feeding devices to increase the versatility of the punch press. A film and slides showed these presses in war production and now running at even higher speeds to cut costs.

Previous to the technical session, Charles W. Monigle, past chairman, installed the following officers in a brief ceremony: Carl D. Schofield, chairman; Carroll L. Morse, first vice-chairman; Harold F. Thompson, second vice-chairman; Ralph A. Baker, secretary; and Bernard D. Szarek, treasurer.

Donovan Inducts Officers, Presents Technical Quiz

Los Angeles, Calif.—Installation of officers highlighted the March 3 meeting of Los Angeles chapter.

Chairman Leslie F. Hawes reported on chapter activities during the year, including the semi-annual convention here, the chapter's participation in Society affairs through representation on national committees, and his work as a member of the Exposition Committee in charge of the tool show at Cleveland last March.

National Director T. J. Donovan, Jr., of Philadelphia, Pa., presented a past chairman pin to Mr. Hawes and praised his stewardship of the chapter for the past two years. He envisioned Los Angeles becoming the greatest city in the United States and the local chapter the greatest in the Society.

Mr. Donovan then administered the oath of office to the incoming officers: R. G. Stronks, chairman; G. J. Walkey, first vice-chairman; Wayne Ewing, second vice-chairman; Rudolf Regen, secretary; R. H. Powroznik, treasurer; Mr. Hawes, delegate; and Anton Peck, alternate.

After the installation Mr. Donovan presented his educational and entertaining technical quiz program, a feature enjoyed by the ladies present as well as by the engineers.



Columbus Representatives

Albert W. Montague (left), retiring Columbus chairman, was delegate for his chapter at ASTE annual meeting in Pittsburgh last month. Walter E. L. Bock, another former chairman, attended convention as alternate

New Officers Installed

Indianapolis, Ind.—One hundred and twenty members and guests gathered at the Athenaeum March 3 to witness the induction of 1949 officers of Indianapolis chapter. The following were sworn in to their respective offices: H. W. Curfman, chairman; R. F. Krause, first vice-chairman; E. W. Hilkenbach, second vice-chairman; G. R. Duncan, secretary; D. F. White, treasurer; J. E. Horton, delegate.

After the installation ceremony, a Technicolor sound picture, "History of American Aviation," was presented by Eastern Air Lines, Inc. Although this film is a recent release, aviation is moving ahead so fast that several additions would be necessary to bring it up to date. The large attendance indicated general interest in the subject.



Professor John C. Tonkin of the University of New Hampshire, butters a Parker House roll as he listens to a dinner companion at recent Boston chapter meeting. A charter member, Professor Tonkin is co-inventor of an aluminum cane for the blind, tailored to height of the user, which he demonstrated during the evening

Hub Election Resembles N.E. Town Meeting

Boston, Mass.—Election night at Boston chapter took on all the aspects of an oldtime town meeting. With 275 members present New England Mutual Hall was practically rocking with joviality as Chairman W. W. Young opened the February 10 meeting.

Victorious in the voting for officers were: Chairman, Joseph P. Crosby, vice-president of Lapointe Machine Tool Co.; first vice-chairman, A. James Leone, vice-president of Chelsea Clock Co.; second vice-chairman, Prof. Prescott A. Smith, mechanical engineering department, Massachusetts Institute of Technology; treasurer, Wilfred B. Wells, vice-president, Waltham Precision Tool Co.; and secretary, Karl Nowak, tool supervisor, Sturtevant Div., Westinghouse Electric Corp.

J. B. Savits of Pneumatic Scale Corp. was named delegate, with Mr. Crosby as alternate. Ralph I. Robbins, chief project engineer of Anderson-Nichols, Inc., was chosen delegate to the Engineering Society of New England.

Gadgeteers Show Inventions

At the gadget session preceding the election, John W. Geddes, chief engineer of H. K. Porter Co., Inc., presented a complicated device in a milling fixture for cutting compound angles. Prof. John C. Tonkin of the University of New Hampshire explained and demonstrated his latest patented invention, an aluminum cane for the blind, said to telegraph sound better than wood.

As an added feature Lester B. Friend, president of Friend Box Co. of Danvers and of the New England Live Steamers Association, talked on his hobby of building and running scale model live steam locomotives.

After explaining the aims and purposes of this hobby, Mr. Friend exhibited six locomotives, all coal fired, then showed a color film of meets in which the Live Steamers have appeared.

The ensuing question period revealed that many chapter members also are live steam enthusiasts in their spare time.



Houston executives visit after dinner at annual executives night featuring James Y. Scott (center, facing camera), president of Van Norman Co., as main speaker

Scott Reports to Texans On Situation in Europe

Houston, Texas—Houston chapter started the year with its annual Executives Night. Among the 148 members and friends present were executives from major companies in the Southwest.

James Y. Scott, president of Van Norman Co., Springfield, Mass., gave his impressions of Great Britain in its present austerity program. Mr. Scott recently visited Europe and reported firsthand on the situation.

He kept his audience interested for the entire evening while he discussed English customs, postwar conditions and future expectations.

Marvin Hurley of the Houston Chamber of Commerce spoke of benefits derived from regular meetings of technical men. Such benefits, both social and professional, should be grasped by the progressive engineer, he said.

Judkins Tells Advantages Of Carbide Tools

Elmira, N. Y.—"Metal Cutting with Sintered Carbides" was discussed before Elmira chapter, March 7, by Malcolm F. Judkins, chief engineer, Carbide Div., Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.

Mr. Judkins reviewed carbide from its early development to present day usages. Using a blackboard he detailed methods of design and application.

Advantages of carbides claimed by the speaker are: three times as rigid, hard, and free of porosity as steel; same specific gravity twist as steel; 20 to 100 times the life of steel in punches and dies; economical through its versatility.

The speaker also explained how the cost of carbide has been reduced. Quality is never an accident, he emphasized in closing.

The following officers were installed during the meeting: Patrick G. Pecoraro, chairman; Donald K. Smith, first vice-chairman; Varner T. MacRorie, second vice-chairman; Mads H. Kristensen, secretary; Robert N. Patterson, treasurer; James Deegan, delegate; and Bert J. Seifried, alternate.

Past Chairman Floyd Allen acted as master of ceremonies.

Callies Advanced To Chairmanship

St. Louis, Mo.—Approximately 150 members and guests attended the election night meeting of St. Louis chapter, February 3, at DeSoto Hotel.

Officers chosen from the slate of candidates submitted by the Nominating Committee are: Chairman, W. G. Callies; first vice-chairman, Emil Stempfle; second vice-chairman, L. W. Greenblatt; secretary, E. P. Huchzermeier; treasurer, P. M. Hoffman; delegate, H. M. Creasey; and alternate, E. H. Ruder.

Following the business meeting Arch King, local diamond tool manufacturer, discussed industrial and jewel diamonds. A film, "The Eternal Gem," showed the mining and cutting of this precious stone.

Success or failure of modern machine shop operations can hinge on the use or abuse of diamonds. All too often the art of using them is taken for granted. Principal application is in wheel dressing, but boring and turning with diamond tools are rapidly gaining in importance, the speaker emphasized.

At the conclusion of Mr. King's program, the audience engaged him in a lively question period.

Boston Invites Ladies To Installation Ceremony

Boston, Mass.—Installation of Boston chapter officers was combined with Ladies Night at a dinner meeting, March 5, in Hotel Puritan.

Some 300 persons were present to see 1949 chapter executives installed by V. H. Ericson, retiring third vice-president. Those inducted were: Chairman, J. P. Crosby of Lapointe Machine Tool Co.; first vice-chairman, A. J. Leone of Chelsea Clock Co.; second vice-chairman, P. A. Smith of Massachusetts Institute of Technology; treasurer, W. B. Wells of Waltham Precision Tool Co.; and secretary, K. G. Nowak of Westinghouse Electric Corp.

A social hour preceded dinner, served to the accompaniment of Jacques Renard's orchestra. Following a program of entertaining, dancing was enjoyed.

Ancients Worked on Jet Propulsion, Says Army Flyer

Rockford, Ill. — Approximately 100 members of Rockford chapter attending the annual election meeting, February 10 in the Lafayette Hotel, heard Major Howard T. Markey talk on "Jet Propulsion."

The theory of jet propulsion, he began, is not new as experiments were conducted in this field more than 2000 years ago. An old Greek philosopher named Hero devised a gadget which performed satisfactorily. It consisted of a sphere mounted on an axis and having two exits diametrically opposed on its diameter. Steam was piped in through the axis and discharged through the two openings. Modern analogies of this jet job are the lawn sprinkler and the 4th of July pinwheel.

In the F80 "Shooting Star," Major Markey explained, air is channeled into the engine via ducts until it reaches an air compressor where it is compressed 5:1. This compressed air is then led into a system of 14 cans where it is met by kerosene under 450 lb psi. Started by a spark plug, the engine works like a blow torch. . . . The thrust against the engine moves the plane forward.

Ram Jet Must Start at High Speed

Another form of jet propulsion touched upon was the ram jet, likened to a wing containing mostly fuel. In order to operate independently, the ram jet must have high initial air speed. This is usually accomplished y launching from a mother ship traveling at a comparatively high rate of speed.

In operation, this self-feeding blow torch is a simple tube gulping air that is compressed by the ram effect of its own forward movement. The air is sprayed with fuel, burned in a combustion chamber, and spewed out the tail at high velocity.

From jets he went on to guided missiles of the V-2 class. This weapon carries 8½ tons of methyl alcohol and liquid oxygen for fuel. In 60 seconds it consumes its entire fuel supply, reaches a speed of 3500 mph, and an altitude of 112 miles.

What are the possibilities of a trip to the moon via a rocket of this type? Major Markey seems to think that the prospect looks promising. The rocket, he stated, would have to be built in a series of separate rocket motors each with its own fuel supply. The first motor or stage would push the ship up a few hundred miles. After its fuel supply had been exhausted, it would drop off. Each successive stage adds more power and speed. When the earth's gravitational pull is overcome, very little power is needed to propel the rocket through space towards its destination.

However there are problems to be solved—heat, oxygen, food and water, a system of braking and fuel for the return trip.

Major Markey was kept busy answering questions pertaining to his experiences in testing the F80 and on subjects relating to jet propulsion.

One of the hardest things to get used to in flying jet planes, he said, is the difference in landing procedures as compared with conventional airplanes. The usual method of cutting back on the throttle when overshooting a landing results in killing the flame of your blow torch. Pouring coal when undershooting a landing floods the chamber and also drowns the flame.



Major Howard T. Markey (left), army jet flyer, chats with Howard Nelson, Rockford chairman, before addressing chapter on subjects of jet and rocket propulsion

In addition to Major Markey's illustrated talk, a 20-minute color-sound film of the F80 "Shooting Star" was shown. The audience had the unusual experience of flying along with the pilot through all his maneuvers, effected by having a camera strapped to the pilot's head.

Although only 27 years old, Major Markey has 2400 flying hours to his credit, was one of the first persons to test a jet propulsion aircraft for the United States Army, and one of the earliest pilots to fly a jet plane to Alaska.

Thinking About Vacation?
Plan it around the ASTE convention at Montreal in October.



Coulter Voted Chairman By Golden Gate Group

San Francisco, Calif.—James V. Coulter was elected chairman of Golden Gate chapter at the annual meeting held February 15 in El Curtola Club, Oakland.

Other officers elected to serve during the 1949-50 season are: I. S. Minetti, first vice-chairman; G. B. Berlien, second vice-chairman; Sanford Wixson, secretary; and H. Basil Keys, treasurer.

Elected to represent the chapter at the national convention in Pittsburgh were: T. J. Rohrer, delegate; and G. B. Berlien, alternate.

The Nominating Committee presenting the slate of candidates for chapter office was headed by Past Chairman E. J. Raves.

Chairman Ernest Holden presided and called on committee chairmen for their annual reports. Karl L. Bues, national director and a former chairman of the chapter, gave a resume of nominees for directors and the membership indicated candidates preferred for the guidance of their delegate.

Following the business session, Irving A. Berliner, deputy collector of internal revenue, reviewed the "History of Federal Taxation." In a subsequent question period the audience gained valuable information for filing income tax returns.

Technical feature was the presentation of a film, "Magnesium—the Miracle Metal." The motion picture depicted the story of the light weight metal from sea water to finished castings, including molding, machining and other processes. Ninety members and guests were present for the meeting.

Ladinig Heads Students

Detroit, Mich.—Detroit College of Applied Science section of Detroit chapter met at their school, February 24, to elect officers for the coming year.

A. R. Conrad, chairman of the section, conducted the vigorously contested election. Successful candidates are: Chairman, Ernest Ladinig; vice-chairman, William Rice; secretary, Roger Gamache; and treasurer, Donald Walker.

Monta O. Cox, Detroit chapter chairman, installed the new officers.

In the afternoon of the same day, 45 section members toured Apex Foundry, Inc. Arrangements for the tour were made by Education Chairman Ladinig. Harry A. Weiner, office manager, welcomed the students in the absence of Emil Wulz, company president.

Through cooperation of the management, a pour was scheduled to coincide with the visit. The students saw castings up to 18 tons being poured. Others weighing from eight ounces to 20 tons were inspected by the group.

The visitors watched all foundry operations from sand preparation through molding to the actual pour.

Other plant tours are being planned.

Officers of Detroit College of Applied Science section of Detroit chapter are installed by M. O. Cox, Detroit chairman. From left: William Rice, vice-chairman; Donald Walker, treasurer; Roger Gamache, secretary; Ernest Ladinig, chairman of student group

Rochester Holds Election At Centennial Meeting

Rochester, N. Y.—Election night and the 100th meeting of Rochester chapter were observed jointly, February 7, at Rochester Institute of Technology.

Officers elected to administer the chapter for the next year are: William R. Gordon, chairman; Emmett W. Moore, first vice-chairman; James O. Horne, Jr., second vice-chairman; Charles L. DeMartin, third vice-chairman; George E. Codd, treasurer; Robert T. Barnett, secretary; Clifford E. Sears, Earl Pike and Norman Fowler, members of executive board.

Milton Roessel headed the Nominating Committee submitting the slate of candidates. Tellers for the election were Gerald K. Sick, James McCabe and Ernest Schramm.

Donald Kohler, chapter historian, traced the history of the chapter from its inception ten years ago with 65 chapter members.

William Gordon, program chairman, introduced W. L. Buell and H. G. Granger of the Bellows Co. The latter discussed the use of air power for machine operations, illustrating with a sound film actual operations of air cylinders and accessories.

Chairman H. O. Simon presided over an attendance of about 125.

* * *

First social event of the year was a round and square dance, February 5, at Doud Post American Legion Home.

Attended by more than 100 couples, the dance was so successful that it is expected to become an annual affair. Music was furnished by "Tumbleweed Tom's" orchestra, with solos by "Dolly" and square dance calling by "Woody."

A number of couples entered into the spirit of the occasion by attiring themselves in gingham dresses, lumber jackets and dungarees.





Left: William R. Gordon (at right), new chairman of Rochester chapter, is congratulated by Earl Pike, elected to the executive board. Right: H. G. Granger of the Bellows Co. discusses air power for machine operations

Burt Looks at Industry

Providence, R. I.—Clayton R. Burt, president and general manager, Potter & Johnston Co., Pawtucket, addressed Little Rhody chapter, February 16, on the "Future of Industry."

Pertinent anecdotes, interjected in his description of industrial conditions here and abroad and prospects for the future of business, put his message across in an entertaining manner.

Following Mr. Burt's speech, Ray H. Morris of Hartford, Conn., ASTE building finance chairman, explained the building fund subscription drive now in progress.

The Nominating Committee presented a slate of candidates for chapter offices. All were elected without additional nominations from the floor.

The new officers are: Chairman, Delbert Krahnke; first vice-chairman; Anthony Ward; second vice-chairman, Frank Cary; secretary, Carl George; and treasurer, Matthew Grochmal.

Mr. Krahnke was chosen delegate with Mr. Ward as alternate to the House of Delegates at Pittsburgh.

Davis Wins Chairmanship At Twin States Election

Springfield, Vt.—Twin States chapter elected its officers for 1949-50 during a dinner meeting, February 9, at the Trade Winds Cafe.

Headed by Past Chairman William Farrell, the Nominating Committee presented its slate of recommended candidates. The following were elected to office: Chairman, Lee M. Davis, Jones & Lamson Machine Co.; first vice-chairman, Herbert H. Ranney, Cone Automatic Machine Co.; second vice-chairman, Floyd J. McArthur, Jones & Lamson; treasurer, Clifford A. Howe Cone Automatic; and secretary, George Julien, Jones & Lamson.

Mr. Davis was elected delegate to the annual meeting at Pittsburgh, with Mr. Julien as alternate.

After the election J. H. Penney, electrical engineer from General Electric Co., Schenectady, N.Y., lectured on "Electronic Motor Controls." He showed slide illustrations of applications of control panels and machines utilizing electronic control.

At the conclusion of his talk, Mr. Penney answered a number of questions from the floor.

Visitors included: Edward P. Dublac, Firth-Sterling Steel & Carbide Corp., Hartford, Conn.; Emil M. Mattson, Westminister, and Don L. Miller, Windsor, Vt.; W. B. Parker of General Electric Co., who accompanied Mr. Penney; Robert A. Cooper, Boston, and Robert H. Langdon, Worcester, Mass.; F. B. Engel, Claremont, N. H.; and several guests from town.

ASTE Students to Demonstrate Tools at Eng. Show

Lawrence, Kans.—Students of the University of Kansas school of engineering and architecture will present their 1949 engineering exposition, April 22 and 23. The ASTE student chapter sponsored by Kansas City chapter plays a prominent part in the exposition, demonstrating machine tools and processes in their recently completed Fowler shops building on the campus.





The new structure contains a modern foundry, a large-scale hot and cold forming department, welding laboratory, heat treatment processes, an up-to-date machine shop, pattern shop, industrial plastics, and an air-conditioned precision measurement laboratory.

Last year the student group accommodated approximately 4000 visitors in their old building, to watch the processing of souvenir ash trays, tack hammers, and small gears. This year there will be a production assembly line of a small souvenir wood plane.

In addition to the student exhibit, Kansas City chapter members will display products of their firms.

Top: ASTE student group at University of Kansas will demonstrate machine operations at public engineering exposition as G. G. Gasal (below) is doing. Mr. Gasal shows two fellow students how pantograph works

Mosher, Detroit Manager

Detroit, Mich.—H. H. Mosher has been named manager of carbide sales for the Detroit district by Firth-Sterling Steel & Carbide Corp., McKeesport, Pa. Formerly he was manager of the Buffalo sales district.

For nearly 17 years Mr. Mosher has been associated with the tool and die industries. He is a mechanical engineering graduate of the University of Pennsylvania and an active member of Buffalo-Niagara Frontier chapter of the Society.



These officers of Tri-State College junior division of Fort Wayne chapter have maintained a student membership of 75 during their six-month administration. From left: Willard Hartman, secretary; William J. B. Ingham, Jr., chairman; Ralph Pashby, treasurer; and O. B. Gill, vice-chairman, of the student tool engineers at Angola, Ind.

Tri-State Officers Keep Membership at High Level

Angola, Ind.—Officers of Tri-State College junior division of Fort Wayne chapter have achieved a successful administration during their six-month term of office. Although the Tri-State engineering program offers a 27-month course in six different fields, and graduates students every three months, the ASTE junior section officers have kept the membership of their group at 75.

The student executives are: William J. B. Ingham, Jr., chairman; O. B. Gill, vice-chairman; Willard Hartman, secretary; and Ralph Pashby, treasurer.

Each week these men have presented films and technical literature selected to help members with their studies.

New officers are elected twice a year. Only graduating students are permitted to register for the school's tool design course as it is the most difficult part of the mechanical engineering curricula.

Saginaw Valley Elects DeVore '49-50 Chairman

Flint, Mich.—Saginaw Valley chapter, formerly known as Flint chapter, elected officers for the coming year at a dinner meeting held February 17 at Zehnder's Hotel, Frankenmuth. An attendance of 85 included members' sons.

Chosen from the Nominating Committee's slate of candidates are: Chairman, Harold A. DeVore, tool engineer, A. C. Spark Plug Division, General Motors Corp.; first vice-chairman, Benjamin Phillips, Jr., chief process engineer, Lufkin Rule Co.; second vice-chairman, Russell M. Ayers, process engineer, Buick Motor Co.; secretary, Clyde L. Fanning, assistant shop superintendent, General Motors Institute; and treasurer, Robert Fonger, sales engineer, Illinois Tool Co.

Ralph Cook, process engineer at Chevrolet Motor Co. and a former chapter chairman, was elected delegate and Mr. DeVore, alternate.

After the election the group was entertained by Wallace Weber, freshman football coach at the University of Michigan. Mr. Weber showed and narrated a film of the Michigan-Minnesota game.



James Rayer, superintendent of inspection and quality control at Timken-Detroit Axle Co., tells Fond du Lac chapter how to apply statistical quality control

Past Chairmen Honored, New Officers Elected

Fond du Lac, Wis.—Past chairman night was observed at Fond du Lac's annual meeting and election, February 11, at Athearn Hotel, Oshkosh. There were 102 members present.

Former chief executives honored were A. F. Schroeder, Oshkosh, William Felten, Sheboygan, Gideon Kane, Green Bay, and L. J. Kaufman, Manitowoc. K. F. Gallimore and W. E. Rutz, both of Fond du Lac, were not present.

New officers elected are: Chairman, A. L. McKay, Kaukauna; first vice-chairman, William H. Jorgensen, Green Bay; second vice-chairman, Carl J. Jorgensen, Manitowoc; secretary, Robert H. Brecklin, Appleton; and treasurer, George E. West, Kaukauna. Mr. McKay was named delegate and Mr. Brecklin, alternate.

James Rayer, superintendent of inspection and quality control for Timken-Detroit Axle Co., was guest speaker. His subject was "Practical Application of Statistical Quality Control."

Compares Human Being To Electric Current

South Bend, Ind.—Comparing the human drive to electric voltage, William S. Sadler, Jr., of Sadler, Hafner & Assoc., says a man's mistakes may be described as resistance, his brain power as amperes, and the final result, wattage.

In an address, "Engineering a Human Being," given before 65 members and guests of South Bend chapter attending a dinner meeting, February 8, at the Mayfair Restaurant in Mishawaka, Mr. Sadler stated that humans have some similarities to a piece of equipment—a person can be examined, tested and "broken down." Results of testing individuals, he claims, prove that only two percent of the thinking capacity is used.

Perseverance Vital to Success

Two of the most important factors in determining a man's success, he feels, are courage and persistence in approaching and handling a problem. These qualities the speaker rated above a high I.Q.

According to Mr. Sadler, most engineers are poor salesmen. They take their work for granted and fail to realize that salesmanship is required to put engineering across to a prospect.

In conclusion the speaker likened a smooth-running human being to a six-cylinder gasoline engine composed of work, play, family life, social life, religion, and a sense of humor.

Election of officers was held during the meeting with the following chosen to serve for the 1949-50 term: Chairman, Paul Beehler; first vice-chairman, Burdette Davis; second vice-chairman, John Yoder; secretary, Joseph Kim; treasurer, Preston Bidwell; delegate, Norman Smith; and alternate, Mr. Beehler.

Incumbent Officers Retained, Promoted

Hartford, Conn.—Approximately 120 Hartford members met February 7 at The Hedges in New Britain to elect chapter officers for the coming year.

Following dinner Chairman William F. Jarvis opened the business meeting. Richard Smith, nominating committee chairman, submitted a slate of candidates selected by his committee.

Officers elected by the membership are: Chairman, Clayton Parsons; first vice-chairman, Donald Huntting; second vice-chairman, Robert Toppin; secretary, Henry Kuryla; treasurer, Robert Edmunds; delegate, Mr. Jarvis; and alternate, Mr. Parsons.

Retiring President I. F. Holland assisted Mr. Jarvis in conducting the election.

Ray H. Morris, building finance chairman, reported on the construction of the new headquarters building at Detroit and encouraged the purchase of building fund certificates.

Program feature was the tool engineering quiz presented by T. J. Donovan, Jr., ASTE director from Philadelphia. Fifty silver dollars were awarded to members giving correct answers to Mr. Donovan's questions.

ASTE-ASM Present Tool Steel Program

Toledo, Ohio—A recent joint session of Toledo chapters ASTE and ASM featured George A. Roberts, chief metallurgist, Vanadium Alloys Steel Co., in a lecture, "Behavior, Characteristics, Treatment and Application of Carbon and High Speed Tool Steels."

Selective factors Mr. Roberts described as a basis for determining choice of a tool steel for a specific purpose. Carbon, alloy content, and hardenability were listed as selective factors for carbon steel; wear resistance, red hardness and toughness, for high speed steel.

Hardenability was defined as depth of hardness, actual magnitude of hardenability being affected by the mass of material, quenching temperature, and quenching medium. Effect of these variables was illustrated in a slide showing etched specimens of rounds hardened under varying conditions.

Vanadium, he said, imparts toughness to carbon steel by restricting grain size.

High speed steels were classified into three groups: tungsten, molybdenum, and tungsten-molybdenum, then subdivided according to the addition of cobalt to each.

Slides Show Effect of Temper

Mr. Roberts' explanation of the property of toughness was of particular interest. Slides of stress-strain and impact curves showed that a softer temper affords a greater deflection of a given specimen within the plastic range, but lowers the yield strength. The impact curve is therefore a nearly straight line and somewhat insensitive to service requirements.

Carburization and other case treatments for high-speed steel were also briefly discussed. An attendance of 154 representatives of the two organizations heard Dr. Roberts' lecture.

* * *

Wilbur C. Thompson of Detroit Ball Bearing Co. of Michigan was another recent chapter speaker. His subject was "Using Anti-Friction Bearings in Modern Machinery."

Anti-friction bearings, said Mr. Thompson, are the most accurate standardized product used in tooling. Listing bearings as of three types—ball, roller, and needle, he explained the special properties of each.

Spindle bearings, he added, present the greatest problem to bearing engineers since greater speed and accuracy are constantly demanded. Small sized air turbine grinder spindles have been designed to turn 100,000 rpm.

Mr. Thompson's explanation of preloading and his discussion of A.B.E.C. and R.B.E.C. classifications were enlightening. Another point of especial interest was the detailing of vaporized oil lubrication and cage materials.

In an after-dinner talk, H. L. Tigges, vice-president of the Society, outlined his assignment with the National Security Resources Board at Washington.

Eighty-one men attended this meeting.



Elected to conduct affairs of North Texas chapter for the coming year are, from left: John J. Vanderweel, second vice-chairman; John J. Turvene, first vice-chairman; Ephrem L. Minch, chairman; Arnold E. Unruh, secretary; John A. Lapham, delegate, and Eugene S. Libbert, treasurer. Chapter membership embraces Dallas and Fort Worth area



J. A. Taylor, president of Hartford Machine Screw Co., welcomes Hartford chapter officers at recent tour of firm's new plant in Windsor, Conn. From left: Donald Huntting, second vice-chairman; Clayton Parsons, first vice-chairman; Mr. Taylor, William Jarvis, chairman

Names Properties Vital To Good Cutting Fluid

Syracuse, N.Y.—A good cutting fluid must have high resistance to chip pressure, adequate lubricating, cooling and anti-weld qualities. It must also meet tests for flash point, viscosity, odor, copper corrosion and be free of injurious chemicals.

These qualifications were specified by L. H. Sudholz, cutting oil expert from the technical service laboratories, Socony-Vacuum Oil Co., Inc., Brooklyn, N.Y., during a lecture, February 8, before 51 members of Syracuse chapter.

Composition and proper application of cutting fluids, Mr. Sudholz went on, are largely contingent on content, hardness and type of metal being cut. Showing slides of cutting tools in action, he demonstrated directions of pressures upon the tool and point of friction from the chips.

Effects of proper and improper coolant upon the built-up edge were also pictured, results varying with speed and feed employed. He showed that increased tool life and lower tool temperature result from proper stoning of the tool, as compared with an unstoned ground tool. Slides also depicted the cause of cratering and its effect on tool life.

Continuing the speaker explained the effects of iron and chlorinated sulphide on the lubricity of the cutting fluid at the friction point between chips and tool. High sulphur content in an oil, he pointed out, increases chaser life, while drill life is extended by high chlorine content.

He concluded his talk by suggesting oils for various machining operations. A question and answer period followed.

What's Your Hobby?
If it's brought you fun, fame or fortune, tell the ASTE News Editor.

Screw Plant Host to 200

Hartford, Conn.—Some 200 members and guests of Hartford chapter participated in a recent afternoon tour of the new home of Hartford Machine Screw Co. at Windsor. The chapter visit was arranged through the courtesy of J. A. Taylor, company president.

After inspecting plant operations, the group had dinner in the firm's cafeteria. Mr. Taylor described how the new factory was planned and constructed in record time.

I. F. Holland, retiring ASTE president, gave an account of the Los Angeles convention and outlined Society plans for the future.

During the meeting the members elected a Nominating Committee composed of: Richard Smith, chairman, Henry Moore and Jesse George.

K. F. Thomas, public relations chairman, showed several sports films. W. F. Jarvis, chapter chairman, presided and introduced the speakers.

New Officers at Dallas

Dallas, Texas—North Texas chapter met February 11 and elected as officers for the coming year: E. L. Minch, chairman; John K. Turvene, first vice-chairman; John J. Vanderweel, second vice-chairman; Arnold E. Unruh, secretary; and Eugene S. Libbert, treasurer.

After the election the chapter was entertained by T. J. (Prof. I. Q.) Donovan, Jr., who conducted his silver dollar quiz program, a humorous, educational and remunerative presentation. Mr. Donovan heads a heat treat company in Philadelphia and is a national director of the Society.



Incoming officers of Detroit chapter swear to perform their duties to the best of their ability at recent installation ceremony. From left: C. G. Sharpe, Jr., treasurer; J. D. Anderson, 2nd vice-chairman; C. M. Smillie, 1st vice-chairman; and M. O. Cox, chairman

Be Proud of Profession, Holland Tells T. E.'s

Detroit, Mich.—How tool engineering over the past 100 years has improved interchangeable manufacture, giving Americans the highest standard of living in the world, was related by I. F. Holland, retiring president of ASTE, in an inspiring address before Detroit chapter, February 10. Tool engineers, he emphasized, should be proud that they are contributing the ways and means to produce more goods at lower costs.

During his discussion Mr. Holland cited developments in gaging for mass production. Among types of gages explained were the thickness gage to control thickness of metal; sorting, grading and stamping gages for the produce industry, and gages for checking automobile parts such as pistons.

He also mentioned a variable feed milling application involving supersonic hydraulic feed that produces a new type of chips. Typical of this new feature are cutting tools similar to wood working tools, moving 2.40 cu. in. of steel in a 40 sec. cycle on a production run.

At the conclusion of his talk, Mr. Holland reviewed recent Society activities and outlined plans for the future.

President Installs Officers

Officers elected at the meeting are: Monta O. Cox, chairman; Charles M. Smillie, first vice-chairman; John D. Anderson, second vice-chairman; Andrew M. Grant, secretary; and Granville C. Sharpe, Jr., treasurer.

Andrew Carnegie, retiring chairman, was named delegate to the national convention at Pittsburgh, with Mr. Cox as alternate. The new officers were sworn in by President Holland.

Leonard Kiefel, editorial and publicity chairman, gave a resume of his work in issuing the chapter bulletin and announced plans for improving the publication.

* * *

At the previous meeting Herman Goldberg of Snow Manufacturing Co., Chicago, gave a spectacular demonstration of tapping to illustrate his lecture, "High Speed Drilling and Tapping."

Drills don't break from drilling, he contends, but from backing out of a hole. Black sulphur oil was suggested to overcome this problem caused by heat expansion of the tap.

For steel, he stated, it is customary to tap in at 150 sfpm and out at 300 sfpm. Horizontal equipment was recommended for deep hole drilling. The speaker warned against using drill chucks on production.

Lead, said Mr. Goldberg, is the biggest problem in tapping. Lead screws, he added, are satisfactory if used on each spindle. Good spindles with little run-out make reaming unnecessary.

In demonstrating difficult feats on a tapping machine, Mr. Goldberg pointed out that such performances are not magic, merely know-how.

Before the technical address, Milton Fenner, standards chairman, explained the functions and activities of his committee to the 360 men present.

A. R. Conti was technical chairman for the evening and introduced Mr. Goldberg.

Situations Wanted

GRINDING EXPERT and PRACTICAL ENGINEER, age 38, now employed, desires permanent position with progressive company. Twenty-one years' experience, including tooling and precision production; capable of handling men. Resume with references on request. Please reply to Box 161, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

PRODUCTION ENGINEER, young, aggressive; broad background includes eight years' bench experience design and construction of machine tools, fixtures, gages. Qualifications permit acting as methods or quality control engineer or chief inspector. Especially proficient where rigid tolerances must be maintained on intricate parts under intensified production. Mid-West or East preferred, excellent references, salary open. Complete resume on request. Write to Box 162, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

TOOLROOM SUPERINTENDENT, 30 years' experience in machine, tool, and die business, including 12 years' designing and making of intricate molds for plastics. Have held various supervisory positions. Age 48; married; complete resume on request. Please address reply to Box 163, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

New Helicopter Reduces Machinery, Vibration

Springfield, Mass.—With one little gadget a helicopter builder has eliminated most of the machinery for changing the pitch of rotor blades and much of the shuddering vibration that gives pilots the shakes. The new flying machine can be handled with one finger, can even be flown "no hands" for short periods.

Speaking before 50 members and guests of Springfield chapter at a dinner meeting in the Hofbrauhaus, West Springfield, David W. Rabenhorst, service manager, and J. F. McAvoy, sales engineer, of Kaman Aircraft Corp., Windsor Locks, Conn., described this development to increase the stability and safety of such ships.

A tiny tab near the end of each blade, the speakers explained, acts like the control tabs on the ailerons, elevator, and rudder of a conventional airplane, using leverage to twist the big blade.

Another distinguishing characteristic of this aerial vehicle is that it uses two



Stability of Kaman helicopter is demonstrated in "no hands" flight. Company representatives explained device responsible for this improvement in flying comfort and safety, to Springfield (Mass.) chapter members

main lifting rotors of two blades each. Set close together amidships, they intermesh as they whirl. Two counter-rotating windmills are necessary to eliminate the effect of torque—a tendency of the fuselage to turn in the opposite direction from the rotor.

Chapter officers elected during the meeting are: Chairman, Daniel B. Wesson; first vice-chairman, Wendell T. Ingham; second vice-chairman, Jason Doubleday; treasurer, Kenneth A. Stroble; secretary, Peter Scott; delegate, Mr. Wesson; and alternate, Mr. Ingham.

Appointed Chief Engineer

Shreveport, La.—Promotion of Walter Brown to chief engineer of The Brewster Co. has been announced by H. S. Marioneaux, president and general manager. For more than a year, Mr. Brown has served as assistant chief engineer. A member of Columbus chapter, ASTE, Mr. Brown holds a master's degree in mechanical engineering from the University of Vienna.

During 20 years' experience in the petroleum suppliers' industry, he has invented and developed devices now extensively featured in pipeline and drilling equipment.

Coming MEETINGS

BOSTON—April 14. Subject: "Die Design for Inclinable Presses." May 12, all afternoon and evening. Open house and tour of General Motors assembly plant, Framingham. Tour starts 1:30 p.m.; dinner in the evening.

CENTRAL PENNSYLVANIA (York)—April 21. Speaker: P. M. McKenna, Kennametal, Inc., Latrobe, Pa. Subject: "Principles of Design for Cemented Carbide Tools and Appliances." May 19. Ladies' Nite. Program to be announced.

CLEVELAND—May 13. Joint technical society meeting. Society of Automotive Engineers, Tudor Arms Hotel. Dinner 6:30 p.m.; meeting, 8:00 p.m. Speaker: Hans Ernst, director of research, Cincinnati Milling Machine Co., Cincinnati, Ohio. Subject: "Chip Formation, Friction and Finish in Machining Operations."

DAYTON—April 11, 6:30 p.m. Plant tour, Kuhns Bros. foundry. Subject: "Modern Methods in Cast Iron and Alloy Fittings." May 9, 6:30 p.m. Suttmiller's Restaurant. Speaker: Dr. J. F. Libsch, metallurgical consultant, Lepel High Frequency Laboratories, Inc., New York City. Subject: "High Frequency Heating."

DENVER—May 4, 6:30 p.m., Oxford Hotel. Speaker: L. J. Mahlmeister, manager of gage sales engineering, Sheffield Corp., Dayton, Ohio. Subject: "Modern Concept of Gaging Practice."

DETROIT—April 14. Tour through Detroit Edison Channel Plant.

ELMIRA—May 2, 7:00 p.m., Mark Twain Hotel. Speaker: A. Bradford Reed, president, Reed Rolled Thread Die Co., Worcester, Mass. Subject: "Recent Developments in Precision Thread Rolling."

ERIE—May 3, General Electric Community Center. Speaker: Dr. H. B. Osborn, Jr., research engineer, Tocco Div., Ohio Crankshaft Co., Cleveland, Ohio. Subject: "Induction Heating."

HARTFORD—May 20. Connecticut Night, Hotel Elton, Waterbury. Joint meeting of Hartford, Fairfield County and New Haven chapters.

NEW HAVEN—April 14, 8:00 p.m., Dunham Laboratory, Yale University. Speaker: Joseph Benson, field engineer, Eastern Machine Screw Corp. Subject: "Screw Thread Cutting on Screw Machines."

NEW YORK, GREATER—May 2. Speaker: R. Q. Sharpe, Industrial Div., Socony-Vacuum Oil Co., Inc., New York City. Subject: "Hydraulic Systems Used in Machine Industries and Machine Tools."

NIAGARA DISTRICT—May 5 at St. Catharines, Ont. Speaker: R. V. Corlett of DeHavilland Aircraft. Subject: "Jet Propulsion."

PEORIA—May 4, 6:30 p.m., Morton, Ill. Speaker: A. Bradford Reed, president, Reed Rolled Thread Die Co., Worcester, Mass. Subject: "Thread Rolling."

PHILADELPHIA—April 21. Speakers: W. L. Batt, president, and C. S. Gotwals, quality control manager, SKF Industries, Inc., Philadelphia, Pa. Subject: "Quality Control in the Bearing Industry." May 19. Subject: "Hydraulic Control Equipment."

TOLEDO—April 13, 7:00 p.m., Toledo Yacht Club. Speaker: H. L. Stewart, assistant sales manager, Logansport Machine Co., Inc., Logansport, Ind. Subject: "Fluid Power in Action."

TORONTO—May 4. Subject: "Abrasives and Grinding," presented by Canadian Carborundum Co., Ltd.

TRI-CITIES—May 4, 6:30 p.m., Rock Island Arsenal Post Restaurant. Speaker: K. N. Macomber, chief service engineer, The Lapointe Machine Tool Co., Hudson, Mass. Subject: "Surface Broaching."

TWIN CITIES—May 11 at Springfield, Vt. Subject: "Multi-Spindle Automatic Lathes."

Philadelphia Celebrates Its Eleventh Birthday

Philadelphia, Pa.—Philadelphia chapter observed its eleventh birthday at a meeting held February 17 at the Engineers Club.

Ninety-five members and guests sat down at the aniversary dinner. Howard W. Gross offered the invocation and William Pinkstone led group singing. The assembly joined in "Happy Birthday" as a large candle-laden cake was placed on the past chairmen's table. Each of the six former chairmen present spoke briefly as the cake was cut and served.

T. J. Donovan, Jr., a chapter member and national director of the Society, announced that he was making a gift of 50 books and catalogs to the chapter as the nucleus of a technical lending library. The books will be kept at the Engineers Club and are available to chapter members upon presentation of their ASTE membership cards.

Chairman S. R. Boyer thanked Mr. Donovan for his gift and stated that Education Chairman H. W. Gross would appoint a librarian.

Nominating Chairman Clarence Duffany presented a slate of candidates for chapter office chosen by his committee. Officers elected by the membership are: Chairman, Emil Kitzman; first vice-chairman, R. S. Paulsen; second vice-chairman; K. W. Riddle; secretary, E. O. Burton; treasurer, F. J. DeFrates; delegate, P. A. Patterson; and alternate, A. R. Diamond.

"Optical Comparators and Their Applications," the technical subject for the evening was presented by H. L. Murch, chief optical engineer of Jones & Lamson Machine Co.

Works Like Lantern Projector

Mr. Murch gave a brief description and history of the optical comparator. He likened it to the old-fashioned lantern slide projector with a lens or system of lenses, a light source and a viewing screen. Standard units used in industry were explained and illustrated with slides on theory and application.

Its value was demonstrated in checking thread forms and angles, intricate contours and shapes, gear tooth forms, precious metal phonograph needles, and form cutters.

All machines are adaptable for production line inspection by use of jigs set up on the table, Mr. Murch stated. No skilled operators are required. Glass screens with etched outlines, or plastic charts, are available for inspecting standard forms or special designs.

Photographs can be taken to give inspection requirements on jobs sent out to other plants. Outlines of surfaces such as type faces, punches and stamps can be measured or compared with a reflection attachment.

After the lecture the speaker answered questions including specific problems encountered by members. An attendance of 160 was present for the technical program.

Past chairmen of Philadelphia chapter blow out the candles on the chapter's 11th birthday cake. From left: Howard W. Gross, Arthur R. Diamond, John W. Noble, Thomas J. Donovan, Jr., William Battersby and John A. McMonagle



Directory of A.S.T.E. Chapter Chairmen

AKRON, NO. 47
Second Monday *
Theodore R. Mutto, *Chairman*
Republic Stamping & Enameling
Bedford Ave., S.W.
Canton, Ohio

ATLANTA, NO. 61
Third Monday *
Charles M. Jenkins, *Chairman*
1229 University Dr., N.E.
Atlanta, Ga.

BALTIMORE, NO. 13
Wed. after 1st Mon. *
Andrew J. Jones, *Chairman*
3715 Ridgecroft Road
Baltimore 6, Md.

BINGHAMTON, NO. 35
Wed. after 1st Mon. *
Dean H. Erlenmeyer, *Chairman*
2107 Tracy St.
Endicott, N. Y.

BOSTON, NO. 33
Second Thursday *
Joseph P. Crosby, *Chairman*
38 Highland Ave.
Lexington 73, Mass.

BUFFALO-NIAGARA FRONTIER, NO. 10
Second Wednesday *
Erwin A. Slate, *Chairman*
1 Maplewood Dr.
Gasport, N. Y.

CEDAR RAPIDS, NO. 71
Third Wednesday *
John L. Stark, *Chairman*
Advance Service
111 2nd St., N.E.
Cedar Rapids, Iowa

CENTRAL PENNSYLVANIA, NO. 22
Third Thursday *
Charles F. Stephenson, *Chairman*
888 E. Market St.
York, Pa.

CHICAGO, NO. 5
Second Tuesday *
Anton J. Schwister, *Chairman*
2017 N. 77th Ct.
Elmwood Pk., Ill.

CINCINNATI, NO. 21
Second Tuesday *
Henry Bruewer, *Chairman*
6523 Iris Avenue
Cincinnati, Ohio

CLEVELAND, NO. 3
Second Friday *
Glenn A. Hier, *Chairman*
8024 Ackley Rd.
Parma 9, Ohio

COLUMBUS, NO. 36
Second Wednesday *
W. Kenneth Armagost, *Chairman*
2868 N. High St.
Columbus 2, Ohio

DAYTON, NO. 18
Second Monday *
Gordon Letsche, *Chairman*
146 Hadley Rd.
Dayton 9, Ohio

DECATUR, NO. 58
Last Tuesday *
Charles Hobbs, *Chairman*
1638 N. Maple Ave.
Decatur, Ill.

DENVER, NO. 77
First Wednesday *
James R. Matthew, *Chairman*
3423 E. 29th Ave.
Denver 5, Colo.

DETROIT, NO. 1
Second Thursday *
Monta O. Cox, *Chairman*
9562 Longacre Ave.
Detroit 27, Mich.

ELMIRA, NO. 24
First Monday *
Patrick G. Pecoraro, *Chairman*
351 Maple Ave.
Elmira, N. Y.

ERIE, NO. 62
First Tuesday *
Archie E. Weingard, *Chairman*
3012 Wayne St.
Erie, Pa.

EVANSVILLE, NO. 73
Second Monday *
Walter P. Schneider, *Chairman*
525 Lewis Ave.
Evansville 14, Ind.

FAIRFIELD CTY., NO. 6
First Wednesday *
Meredith W. Wilterdink, *Chairman*
RFD #1
Westport, Conn.

FOND DU LAC, NO. 45
Second Friday *
Allan L. McKay, *Chairman*
Rte. 1
W. DePere, Wis.

FORT WAYNE, NO. 56
Second Wednesday *
John F. Davis, *Chairman*
2946 Plaza Dr.
Ft. Wayne, Ind.

FOX RIVER VALLEY, NO. 72
First Tuesday *
Burt J. Phillips, *Chairman*
802 Augusta Ave.
Elgin, Ill.

GOLDEN GATE, NO. 28
Third Tuesday *
James V. Coulter, *Chairman*
Coulter Steel & Forge Co.
1498 67th St.
Emeryville, Calif.

HAMILTON, NO. 42
Second Friday *
George Gilmour, *Chairman*
1 Hillside Ave.
Dundas, Ont.

HARTFORD, NO. 7
First Monday *
Clayton S. Parsons, *Chairman*
J. K. Smit & Sons, Inc.
10 N. Main St.
W. Hartford 7, Conn.

HOUSTON, NO. 29
Second Tuesday *
Paul E. Brainard, *Chairman*
255 Fauna
Houston 12, Texas

INDIANAPOLIS, NO. 37
First Thursday *
Howard W. Curfman, *Chairman*
317 N. Holmes Ave.
Indianapolis 22, Ind.

KANSAS CITY, NO. 57
First Wednesday *
Samuel M. Waas, *Chairman*
4119 Highland
Kansas City 4, Mo.

LITTLE RHODY, NO. 53
Third Wednesday *
Delbert C. M. Krahnke, *Chairman*
20 Shortway Rd.
Cranston 10, R. I.

LOS ANGELES, NO. 27
Second Thursday *
R. Gerald Stronks, *Chairman*
4225 Irving Pl.
Culver City, Calif.

LOUISVILLE, NO. 54
Second Wednesday *
Norwood H. Booker, *Chairman*
3125 Eagle Pass
Louisville 13, Ky.

MADISON, NO. 75
Tues. after 1st Mon. *
Vern McFair, *Chairman*
3506 Lake Mendota Dr.
Madison, Wis.

MID-HUDSON, NO. 74
Second Tuesday *
Joseph L. Petz, *Chairman*
11 Meadow Rd.
Poughkeepsie, N. Y.

MILWAUKEE, NO. 4
Second Thursday *
Arthur C. Gudert, *Chairman*
R. #7, Box 150
Wauwatosa 13, Wis.

MOHAWK VALLEY, NO. 78
Last Tuesday *
Ernest J. Masucci, *Chairman*
141 Genesee St.
New Hartford, N. Y.

MONTREAL, NO. 50
Second Thursday *
Marc A. Cote, *Chairman*
460 Merton Ave.
St. Lambert, Que.

MUNCIE, NO. 70
Second Wednesday *
Charles L. Marker, *Chairman*
1301 S. Beacon St.
Muncie, Ind.

NASHVILLE, NO. 43
Third Friday *
Sidney W. Stowell, *Chairman*
Box 45
Donelson, Tenn.

NEW HAVEN, NO. 41
Second Thursday *
Gerard P. Schoeller, *Chairman*
Marlin Firearms Co.
85 Willow St.
New Haven 11, Conn.

NEW YORK, GREATER, NO. 31
First Monday *
Julius Schoen, *Chairman*
1015 Grand Concourse
New York 52, N. Y.

NIAGARA DISTRICT, NO. 65
First Thursday *
Norman B. Coleman, *Chairman*
13 South Dr.
St. Catharines, Ont.

NORTH TEXAS, NO. 51
Second Friday *
Ephrem L. Minch, *Chairman*
613 Edgefield Rd.
Ft. Worth 7, Texas

NORTHERN NEW JERSEY, NO. 14
Second Tuesday *
John E. Epprecht, *Chairman*
RFD 1, Parsippany Blvd.
Boonton, N. J.

PEORIA, NO. 31
First Tuesday *
Harold E. Schmidt, *Chairman*
1016 Miller St.
Washington, Ill.

PHILADELPHIA, NO. 15
Third Thursday *
Emil Kitzman, *Chairman*
3128 Princeton Ave.
Philadelphia 24, Pa.

PITTSBURGH, NO. 8
First Friday *
Frank T. Boyd, *Chairman*
1615 Broad St.
Greensburg, Pa.

PONTIAC, NO. 69
Third Thursday *
Cash Bond, *Chairman*
2 Delaware
Pontiac 18, Mich.

PORTLAND (MAINE), NO. 46
Fourth Friday *
Eldon L. Wishart, *Chairman*
63 Glenwood Ave.
Portland 5, Me.

POTOMAC, NO. 48
Thurs. after 1st Mon. *
Harry Springer, *Chairman*
220 E. Windsor Ave.
Alexandria, Va.

RACINE, NO. 2
First Monday *
G. W. Christiansen, *Chairman*
2512 Mitchell St.
Racine, Wis.

RICHMOND, NO. 66
Second Tuesday *
Paul C. Hermansdorfer, *Chairman*
42 S. 12th St.
Richmond, Ind.

ROCHESTER, NO. 16
First Monday *
William R. Gordon, *Chairman*
125 Monteroy Rd.
Rochester 10, N. Y.

ROCKFORD, NO. 12
First Thursday *
Howard A. Nelson, *Chairman*
Barber-Colman Co.
150 Loomis St.
Rockford, Ill.

SAGINAW VALLEY, NO. 68
Third Thursday *
Harold A. DeVore, *Chairman*
2215 Begole St.
Flint 4, Mich.

ST. LOUIS, NO. 17
First Thursday *
William G. Callies, Jr., *Chairman*
Modern Screw Prod. Co.
2307 N. 9th St.
St. Louis 6, Mo.

SAN DIEGO, NO. 44
Second Tuesday *
Glave S. Bunch, Jr., *Chairman*
7884 Broadway
Lemon Grove, Calif.

SCHENECTADY, NO. 20
Second Thursday *
Fred L. Kinum, *Chairman*
General Electric Co.
Bldg. 28—305
Schenectady 5, N. Y.

SEATTLE, NO. 39
Second Tuesday *
Harold R. Pinkerton, *Chairman*
651 W. 51st St.
Seattle 7, Wash.

SOUTH BEND, NO. 30
Second Tuesday *
Paul Beeler, *Chairman*
R. R. #1
Bristol, Ind.

SPRINGFIELD (ILLINOIS), NO. 64
First Tuesday *
William P. Fromuller, *Chairman*
2420 S. 13th St.
Springfield, Ill.

SPRINGFIELD (MASS.), NO. 32
Second Monday *
Daniel B. Wesson, *Chairman*
55 Stockbridge St.
Springfield, Mass.

SPRINGFIELD (OHIO), NO. 76
Fourth Thursday *
Roy H. Mumma, *Chairman*
Patrick Rd.
Springfield 52, Ohio

SYRACUSE, NO. 19
Second Tuesday *
Fay Adkinson, *Chairman*
Syracuse Heat Treating Co.
1223 Burnet Ave.
Syracuse, N. Y.

TOLEDO, NO. 9
2nd and 4th Wednesday *
Rolland H. Mogle, *Chairman*
3722 Leybourne Ave.
Toledo 12, Ohio

TORONTO, NO. 26
First Wednesday *
Frederick J. Crook, *Chairman*
56 Delemere Ave.
Toronto 9, Ont.

TRI CITIES, NO. 23
First Wednesday *
Donald A. Wangelin, *Chairman*
2042 43rd St.
Rock Island, Ill.

TWIN CITIES, NO. 11
First Wednesday *
Raymond L. Martin, *Chairman*
4248 10th Ave. S.
Minneapolis 7, Minn.

TWIN STATES, NO. 40
Second Wednesday *
Lee M. Davis, *Chairman*
61 Elm St.
Springfield, Vt.

WESTERN MICHIGAN, NO. 38
Second Monday *
John T. Maghielse, *Chairman*
1430 Garfield N.W.
Grand Rapids 4, Mich.

WICHITA, NO. 52
Second Wednesday *
William F. Grabendike, *Chairman*
406 N. Clifton
Wichita, Kansas

WILLIAMSPORT, NO. 49
Second Monday *
Edwin H. Sears, *Chairman*
1356 Mansel Ave.
Williamsport, Pa.

WINDSOR, NO. 55
Second Monday *
William A. Thomas, *Chairman*
Ford Motor Co. of Canada, Ltd.
Tool Design Dept., Plant 2
Windsor, Ont.

WORCESTER, NO. 25
First Tuesday *
Carl D. Schofield, *Chairman*
1 Reynolds St.
Worcester 6, Mass.

* CHAPTER MEETING NIGHT

North East West South IN INDUSTRY

S. W. Corbin has been appointed assistant manager of the industrial divisions of **General Electric's** Apparatus department, it has been announced by K. H. Runkle, divisions manager. Mr. Corbin is also manager of the Resale Industries division, and will retain that title along with his new appointment.



Leslie McArthur



S. W. Corbin

Leslie McArthur, vice president, has been elected a member of the board of directors of **Niles-Bement-Pond Co.**, it has been announced by Frederick U. Conard, president and chairman. Mr. McArthur first joined the company in 1947 as manager of the Chandler-Evans division.

R. C. Sebold has been appointed director of engineering of **Consolidated Vultee Aircraft Corp.**, it was announced recently. Mr. Sebold, who has been with Convair for 19 years, was formerly chief engineer of the Fort Worth division.

Russell F. Stuart, formerly head of Eastern sales, has been appointed sales manager of the **Walker-Turner** division of **Kearney & Trecker Corp.**, at Plainfield, N. J. Mr. Stuart has been associated with Kearney & Trecker for 23 years.

Orrin B. Werntz, formerly executive secretary of the National Screw Products Association, has been named managing director of the **Pressed Metal Institute**, it was announced by the Institute. **Jerry Singleton**, with the group since 1947, was appointed assistant manager.

Vincent A. Schmidt, formerly production manager of Baker Bros., Inc., of Toledo, has joined the stud welding division of **Morton Gregory Corp.**, it has been announced.

Standard Pattern Works, Machine division, has announced expansion of its facilities and removal of operations to a new location at 13781 Concord Ave., Detroit. **C. H. Miller** is president of the corporation.

Joseph T. Ryerson & Son, Inc., has begun an addition to their Chicago steel service plant which will provide another 118,000 sq ft of plant and office space. Overall plant capacity when the addition is completed will be from 75,000 to 100,000 tons of steel warehouse stock.

The **Wisconsin Carbide Tool Co.** announces the removal of manufacturing from their Fond du Lac Ave. address to their new plant at 3343 North 35th St., Milwaukee 10.

R. D. Cortelyou has been named Pacific coast manager of a newly-opened sales office and warehouse of **A. Milne & Co.** Headquarters will be at 1245 22nd St., San Francisco.

George Gorton Machine Co., Racine, Wis., has been awarded the 1948 plaque of the Labor Relations Institute, New York, for achievement in industrial relations.

An advanced training course in carbide cutting tool practice is now being offered at the **Wendt-Sonis** training school at Hannibal, Missouri, it has been announced by **T. V. Hilt**, director of training. The course, given without charge, lasts one week, and is given by men from industry.

Reltool Corp., Henry M. Blume, president, has acquired a new plant with floor space of 20,000 sq ft, in Milwaukee. The plant will aid in the expansion of facilities for increased metal cutting tools.

Walter F. Benning has been appointed chief engineer, and **Philip C. Johnson**, assistant chief engineer, of **Willys-Overland Motors**, it has been announced. Both men had been on the staff of the vice president in charge of engineering.

COMING MEETINGS

Apr. 11-12. **American Institute of Electrical Engineers.** Conference on industrial applications of electron tubes; Hotel Statler, Buffalo.

Apr. 11-12. **American Machine Tool Distributors Assn.** Annual meeting; Hotel Oglethorpe, Savannah, Ga.

Apr. 11-13. **American Society of Lubrication Engineers.** Annual meeting; Hotel Statler, New York.

Apr. 19-20. **Magnesium Assn.** Annual meeting and exhibition; Edgewater Beach Hotel, Chicago.

Bruce F. Olson has been elected president and general manager of the **Sundstrand Machine Tool Co.**, Rockford,, Ill., and its subsidiary, American Broach and Machine Co., of Ann Arbor, Mich., at a meeting of the board of directors of the company. At the same time, **O. G. Nelson** was elected chairman of the board. **Gilmore J. Landstrom** and **Gust H. Ekstrom**, directors, were elected vice presidents, and **Howard H. Ekstrom** was made assistant secretary and treasurer. Other officers of the firm include **A. E. Johnson**, vice president; and **Ira J. Shobe**, secretary and treasurer.



Leo P. Gajda



Bruce F. Olson

Leo P. Gajda, formerly chief draftsman, has been appointed director of engineering of **Snyder Tool & Engineering Co.**, it has been announced by Howard N. Maynard, president. He succeeds **George D. Melling**, who resigned to form a new company, **McCoy-Melling**, which will represent Snyder throughout Michigan with the exception of metropolitan Detroit. At the same time, **Elwood M. Keifer** was appointed chief draftsman to replace Mr. Gajda.

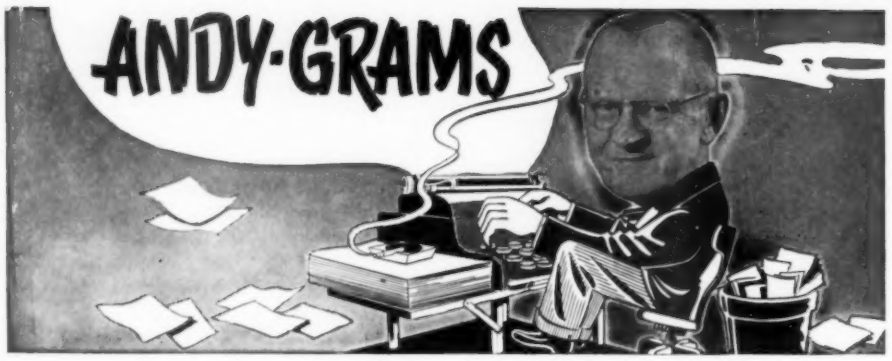
OBITUARIES

Winfred W. Elliott, founder of the **Elliott Manufacturing Co.**, Binghamton, N. Y., died Jan. 26. Mr. Elliott organized the present company, which produces flexible shafting, in 1932.

Gilbert L. Church, assistant treasurer of **Brown and Sharpe Mfg. Co.**, died suddenly at his home in Lincoln, R. I., on Feb. 27. Mr. Church joined the company in 1906 as assistant cashier.

Alvin B. Einig, general manager and a director of **Motch & Merryweather Machinery Co.**, Cleveland, died recently after a short illness. Mr. Einig joined Motch & Merryweather after his graduation from Case in 1909, and remained with them until his death, with time out during both wars for governmental service.

James A. Wright, vice president and general manager of **Morse Twist Drill and Machine Co.**, New Bedford, Mass., died suddenly on March 3. Mr. Wright had been with Van Norman Co., then assumed his recent position with Morse Twist Drill when that company was purchased in 1946 by Van Norman.



Having been on a tour taking in Tri-State College, Angola, Ind., Fox River Valley, Tri-Cities and adjacent Territory along with the Annual, I should have plenty of grist for the mill —and, as things have turned out, plenty of enthusiasm for the writing. But, the breaks went agin' me. Came down with the flu in Pittsburgh, and had to hike homeward PDQ, missing the banquet.

Went back to work too soon and agin' Doc's orders, and had a relapse. Now, pick 'n' hunting in bed, I'm 'way past the deadline and still a bit woozey. However, I'm not asking for any sympathy. But it so happens that, several years ago, I tried to write the Column while down with pneumonia—the show must go on' y'know—and the results almost alienated whatever friends I've got in the Society. At this time, then, bear with me while I grope my way through a maze of scrambled notes and a foggy memory.

At Tri-State, where Prof. Alec Gwiasdowski is doing a swell job instilling tool engineering know-how into his charges, I gave the graduating class the lowdown on "life with father"—that is, on the transition from student to learning the practical ropes under the Old Man in the plant. Well, those boys—the most of them ex G.I.'s—should make good in a big way; they're matured, responsible and have taken their studies seriously. Give 'em a break when they come looking for a job.

At Fox River Valley, where I tried to make myself agreeable, I supped with Roger Waindle and Piett (?) Moore, who claimed to be champ of the local Liar's Club. But that was before I got there. The boys were discussing 2, 3 and 4 holers, and I thought they were talking about outdoor plumbing until it dawned on me that they were talking about the late model cars. Well, I can see where accessories like that'd come in handy on a long trip, although I'd deem one hole enough for all practical purposes.

At Rock Island, where Elmer Benson toured me around, I listened agog as a deep sea diver recounting his adventures with the denizens of the deep. On top of that, what I had to say was just anticlimax although, as is usual with our tool engineers, the boys were real polite and even spoke to me afterward. John Speck, came from Cedar Rapids, took a long chance and invited me out that way. Seems they're opening another Chapter in Iowa.

On recommendation of Al Schmit of Toledo, C. B. Teeter—he's the guy with the radius turning tool you'll find somewhere in the Tools of Today—had come all the way from Chi to hear me speak. Hope he and Al are still friends. One young fellow said it took him a long while to figure out what I was talking about, but he finally got it. I said: "That's nothing. It took a guy up in Montreal 8 years to make sense out of my talk there, and look at the fun he had in the meanwhile."

One old timer was figuring on subscribing to the ASTE building fund, and asked my opinion. I said it's good business at good interest and I'll probably be subscribing myself provided the brass'll take money from a minor employee. Apropos which W. Z. Fidler gave me a trick lock for my strong box —you have to open it backwards.

Before leaving Rock Island, dropped in at Augustana College for a visit with Prex Dr. Bergendoff who, after passing the time o' day, turned me over to Dr. Fryxell of the Science Dep't. The latter introduced me to my antediluvian ancestors, including pre-dawn homo sapients who I'd hate to have met in a dark alley. Lunch at Elmer Benson's home, where I played horse with his grandchildren, then to Rockford for a tete-a-tete with Ernest Svenson of John S. Barnes Corp'n. Missed the Rockford meeting and headed for home via Chicago.

From my viewpoint, the Pittsburgh meeting was a huge success, and the local boys can take a deep bow for a job well done. Can't blame 'em for the weather, of course. About the first man I ran into, Wed. nite, was A. O. Sporrey of Aurora who, to show there were no hard feelings, took my dinner check. Later, after a social interlude with some of the boys, snacked with Milt and Mrs Kline of Fort Wayne.

At b'fast, Thursday, I barged in on Jake Demuth and his gang from St. Louis, when I saw Harrel Creasy put down a stack of wheats ringed with sausages and topped 3-deck or so with fried eggs. Bet even Guy Hubbard couldn't get around a meal like that. At dinner, hob-nobbed with Eric Crawford and a contingent of Canadians including Len Singer—who, incidentally, could have taken top honors in the ASTE if he'd stayed in office. Well, the Canadians have contributed some pretty good men to the Society, including Bob Douglas who admits "no craven subservience to standpatters" or whatever he said it was. I've an idea Bob is going to make an outstanding Prex.

To my regret, I missed out on the convention of the Hounds, the boys claiming they called my room where I was waiting for the call. Found out later that all my phone would emit was a barely audible buzz. Anyway, the pack did right well without any help from me.

Breakfasting next A.M., I received a sextette of past Prexies including—of all peoples!—Frank Shuler, Bob Lippard, Bill Smila, Joe Siegel, Bert Carpenter—who tried to register with Chinese money—and Walt Wagner, the latter having had quite a promotion at Lincoln-Mercury. Later, saw Jim Weaver, Clete Briner, Ray Morris and d'Arcambal. Al Sargent came in for special mention a/c his fine work as head of the Housing Com'tee.

The House of Delegates is to be commended for a fine choice of Directors, not so easy considering the many good men on the slate. And that goes for the Directors in the choice of key officers, and for Bob Douglas in his choice of Committee heads. Herb Tigges is seasoned and knows the ropes; Jake Demuth has got what the Swedes call "skin on his nose"meaning he's all jake —and Halsey Owen lends the erudition one would expect from an educator. Yessir, it looks like a good year ahead.

And that, as near as I can figure out, comes pretty near making up the Column for this issue. Anyway, Doris Pratt will give you the whole story about the Convention in the ASTE News. In conclusion, a note to Roger Waindle. Roger, you're right; penicillin does just what you said it does. Helluva note, eh? But that's a joke between ourselves—or is it?

ASTEely yours

Andy

THE TOOL ENGINEER'S *Service Bureau*

FREE BOOKLETS AND CATALOGS CURRENTLY OFFERED BY MANUFACTURERS

Bandsaw

Two-page illustrated folder describes a new utility bandsaw said to give low-cost service with wide adaptability. *The DoAll Co.*, Des Plaines, Ill.

Broaching, Horizontal

Bulletin H-48, four pages, covers a line of horizontal hydraulic broaching machines, for which several improved features are claimed. *Acme Broach Corp.*, Milan, Mich.

Broaching Machines, Vertical

Catalog 400, 12 pages, covers complete line of vertical pull-up broaching machines. Specifications and features of a newly-developed small size are included. In addition, diagrams of the machines are provided, along with photos of applications. *American Broach & Machine Co.*, Ann Arbor, Mich.

Buyer's Chart

Publication has been announced of a Buyer's Comparison Chart for Multiple-Spindle Automatic Bar Machines, which makes provision for comparison and analysis of these facilities. *Cone Automatic Machine Co., Inc.*, Windsor, Vt.

Carbide Dies

Catalog 48-WP, 36 pages, covers a complete line of carbide die and wear parts. Centerless grinder blades, sheet metal draw dies, wire and tube dies, bolt dies, drill jig bushings, gages and solid carbide bars, tube and wear strips. *Metal Carbides Corp.*, Youngstown, Ohio.

Crane, Portable

Four page color folder describes a handy crane unit, consisting of revolving boom mounted on tractor. Boom revolves 320 deg. Lifting capacity is four tons, and it is stated that small size of the unit permits working in and around congested areas. *Clyde Iron Works*, Duluth 1, Minn.

Cylinders, Hydraulic

Catalog section 103, 20 pages, describes line of standard hydraulic cylinders, along with diagrams and layouts to aid in designing circuits. Construction features are included, as well as engineering data. *Gerotor May Corp.*, Baltimore 3, Md.

Duplicators, Hydraulic

Recently released bulletin, four pages, discusses hydraulic duplicators and points out production advantages of hydraulic tracer controlled machining. Equipment can be installed on standard machining equipment. *Walker Hydraulic Duplicator Co.*, Box 72, Standish, Mich.

Dynamometer

Bulletin D, four pages, covers the principles and applications of the Dillon dynamometer. Constructed for measuring traction, tension or weight from 0-500 lb, to 0-20,000 lb with close accuracy. *W. C. Dillon & Co., Inc.*, 5410 W. Harrison St., Chicago 44.

Furnaces, Industrial

Bulletin SC-141, eight pages, describes complete line of standard industrial furnaces. Equipment for hardening, forging, metal melting and other processes is presented. *Surface Combustion Corp.*, Toledo 1, Ohio.

Gear Shaper, Rotary

Recent seven-page folder describes a rotary gear shaper for the mass production of external and internal spur and helical gears. Operations are covered, and sketches of operating parts are included. *The Fellows Gear Shaper Co.*, Springfield, Vt.

Gray Iron Specifications

Recently released is a four page bulletin "Summary of Gray Iron Specifications," covering fourteen sets of specs. The data were prepared in collaboration with engineering societies and the Federal government. *Gray Iron Founders' Society, Inc.*, 210 National City Bank Bldg., Cleveland 14.

Hole Punching Units

Third edition of Catalog BL covers hole punching units for punching mild steel up to ⅛ in. thick. Thirty-two page catalog includes setups, accessories, as well as specifications. *Wales-Strippit Corp.*, North Tonawanda, N. Y.

Jig Borers

Catalog 513, 32 pages, illustrates and describes, in addition to the complete equipment line, several practical phases of boring. Included is material on boring drawings, and the importance of simplification; small-lot production; specifications for the equipment. *Pratt & Whitney division of Niles-Bement-Pond Co.*, West Hartford 1, Conn.

Jig Borer Cutting Tools

Tables for boring holes from 1/16 to 5 in. diameter in materials from ⅛ to 4 in., thick with tolerances up to ±0.0002 in. are included in a booklet offered. Recommendations are included for tools, feed, speed, and estimated time for each boring operation. *Moore Special Tool Co., Inc.*, Bridgeport, Conn.

Materials Handling

Recent catalog on cranes and monorail equipment, 12 pages, illustrated. Covered are a variety of overhead handling equipment, such as cranes, jibs, monorails and accessories. *Abell-Howe Co.*, 53 W. Jackson Blvd., Chicago 4.

Packings for Chemical Service

"Packing for the Chemical Industry," eight pages, is designed to give a complete picture of packing requirements for a wide variety of chemical applications. Description of recently-developed chemically inert packing is included. *Crane Packing Co.*, 1800 Cuyler Ave., Chicago 13.

Racks, Handling and Storage

Portable materials handling equipment recently added to the line is described in a new catalog from Equipment Mfg., Inc. Included are racks for moving and storage; pallet and coil racks; collapsible boxes. *Equipment Mfg., Inc.*, 21550 Hoover Rd., Detroit 5.

Tap Drill Sizes

"Tap Drill Sizes," fourth in a series of wall charts, is available for distribution. Measuring 13 x 19 in., the chart covers screw thread pitches as established by the National Screw Thread Commission. Thread sizes, threads per in., OD of screw, etc., are given for NC, NF and special threads. *South Bend Lathe Works*, 417 East Madison St., South Bend 22, Ind. A charge of $.10 is made for the chart.

Tenite Specifications

A revised edition of the technical booklet, "Tenite Specifications," 42 pages, is now available. This fifth edition contains tables of physical properties, including weather resistance, flexural strength, etc. Flow, acid resistance and other properties are also incorporated in the book. *Tennessee Eastman Corp.*, Kingsport, Tenn.

Toolholders, Carbide

Catalog V-R 430 features complete line of toolholders developed for carbide and cast alloy inserts. Includes vertical ejector-type holders for round, square, and other shapes of tools, as well as horizontal holders and inserts for turning, facing, boring and cut-off operations. *Vascoloy-Ramet Corp.*, 800 Market St., Waukegan, Ill.

Valve, Electric

Bulletin 230, four pages, describes recently developed electric valve for the control of single or double acting air cylinders, air operated presses, and similar equipment. *Hannifin Corp.*, 1101 S. Kilbourn Ave., Chicago 24.

TOOLS OF TODAY



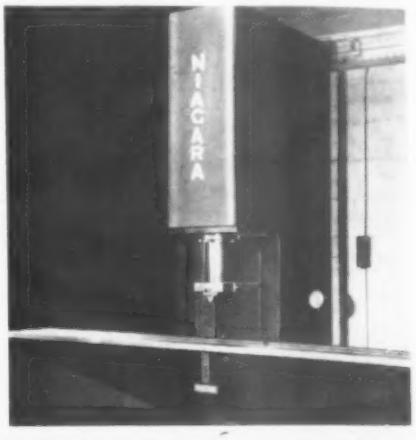
Presses by Niagara

Niagara Machine & Tool Works, Buffalo 11, N. Y., announces a line of all-steel all-welded straight side Presses in both single and double-crank types. Typical of the line is the machine illustrated—a double-crank, single-geared tie rod frame press of 185 tons rated capacity near bottom stroke.

In both types, the high speed shaft and flywheel, with electro-pneumatic clutch, is mounted within the crown above the crankshaft. Air counterbalance for the slide is incorporated and compact design saves space and improves the operative characteristics.

Also, by Niagara, is a Hydraulic Metal Working Press for straightening, forming, broaching, forging and assembling operations. This multi-purpose tool incorporates the Niagara Hydra-Touch Control by which approach speed, applied pressure on the ram and return speed are governed by the movement of one lever conveniently located to give sensitive finger-tip control.

This feature is said to enable the operator to "feel" his way into a job and to give smooth, fast operating cycle. Area of the bed is 30 x 240 in., and maximum capacity of 135 tons is said to be exerted at any point in the 33 inches of ram travel. Both machines are fully described in catalogs, available on request. **T-4-2**

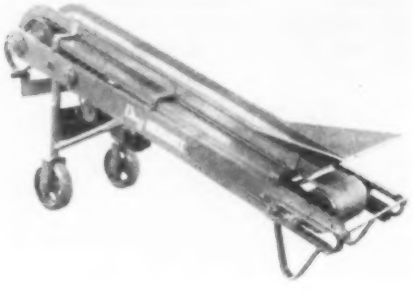


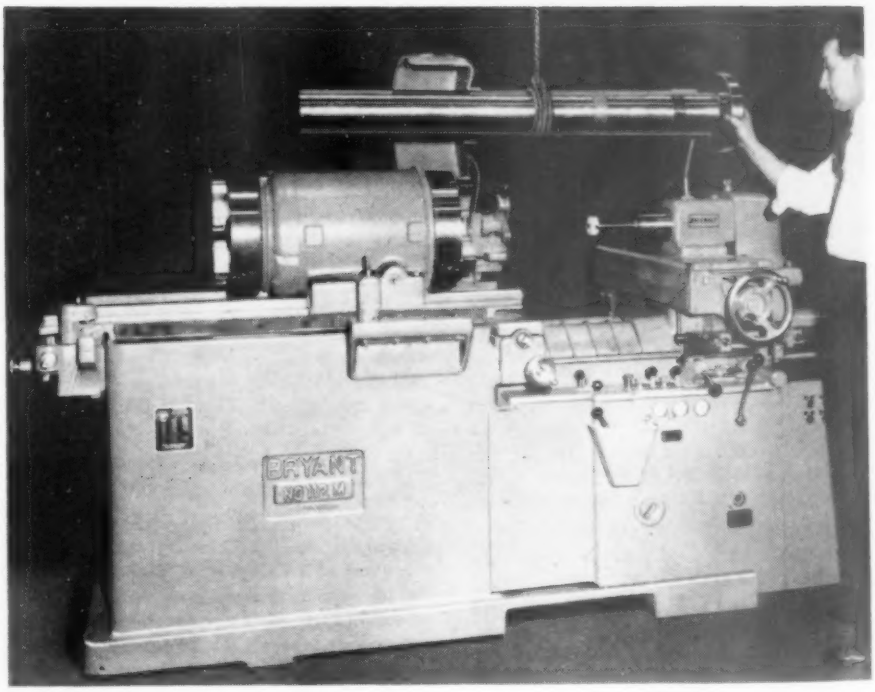
Portable Magnetic Separator

A portable, light-weight inclined belt type magnetic separator to meet foundry requirements for fast, economical recovery of scrap and for sand cleaning is announced by Dings Magnetic Separator Co., 4247 W. McGeoch Ave., Milwaukee 14, Wis. A Dings Alnico Perma-Pulley, used as the head drive pulley for the inclined belt automatically effects a sharp separation of magnetic and non-magnetic material at the discharge end of the conveyor.

The separator is completely portable and is provided with a motor drive for belt conveyor. The magnetic pulley is weatherproof and magnetic permanence is guaranteed by the maker for the life of the separator.

Standard separators are available in lengths of seven or ten feet with belt widths of 12, 14, 16, 18, 20 or 24 inches. Capacities range from 40 to 80 tons of sand per day. **T-4-1**



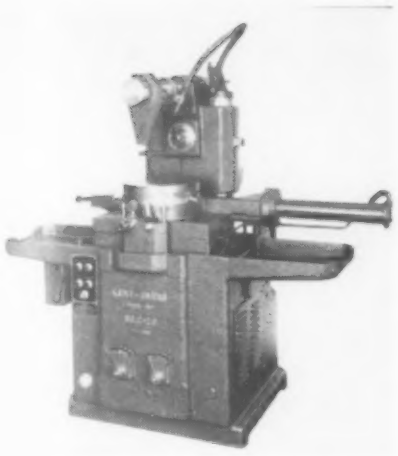


Internal Grinding Machine

An Internal Grinding Machine, by Bryant Chucking Grinder Co., Springfield, Vt., is designed to grind special internal tapers on such parts as machine tool spindles and special axles. Taper control is provided by a sine bar.

A feature of the machine is a double chuck workhead to facilitate precision grinding of large parts; also, an attachment—not shown—permits the workpiece to be indexed 180 deg for finishing both ends of a part.

The workhead, which can be removed longitudinally to position work for grinding, may be removed and replaced by a fixture so that spindles can be ground on their own bearings. The workhead base swivels to provide grinding a maximum included angle of 30 deg, while the wheelhead assembly is moved hydraulically to the rear to facilitate loading of long parts. **T-4-3**



Miller With Rotary Table

A Kent-Owens No. 2-20 milling machine has been equipped with a hydraulically controlled Rotary Table 16 in. in diameter. Replacing the standard table, the rotary table is driven by means of a gear and hydraulically-actuated rack mounted at the rear of the fixture. The desired cycle can be obtained by placing the dogs in the proper position on the outside of the rotary table.

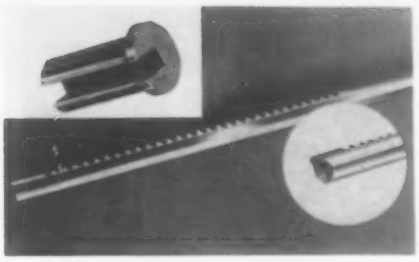
Built by Kent-Owens Machine Co., Toledo, Ohio, the machine has twelve spindle speeds ranging from 64 to 860 rpm. Simple and direct, with only two gear contacts from motor to cutter, the drive is taken from a standard foot-mounted ball bearing motor, at the rear of the machine, and goes vertically through a splined drive shaft, worm and worm gear—then through pick-off gears directly to the cutter. The head is mounted on two cylindrical ground steel posts, which carry the spindle midway between them—a feature said to provide unusual rigidity with no overhang and no possibility of cocking action. **T-4-4**

Low Temperature Cabinets

Rugged construction, simple control, and quick pull-down of temperature to as low as -240 deg F are claimed as major features for the line of "tailor-made" low-temperature mechanically refrigerated cabinets now being made available on a national basis by Industrial Cold Co., 14550 Third Ave., Detroit 3, Mich. The self-contained refrigeration system employs two stages of compression with refrigerant control being handled by a somewhat unconventional arrangement of high-side floats.

The cabinets are designed to produce the four ranges of temperature usually required in low temperature work: O to -50 deg, -50 to -80 deg, -80 to -120 deg, and from -140 to -240 deg F.

Industrially, this "machine tool" has been used for shrink fits, treatment of metals such as normalizing by intermolecular stabilization, and speeding the aging of ferrous metals or retarding the aging of aluminum. **T-4-5**



Push Broaches and Bushings

The du Mont Corporation, Greenfield, Mass., announces an improved, low-priced "Minute Man" push broach for multiple cutting of keyways in moderate quantities. It is available in keyway widths from 1/32 to ¼ in., and may be had for any desired hole diameter.

Designed for use with hydraulic or hand operated arbor presses, the broach supports itself in the hole to eliminate need for a guide. The makers state that only one pass is necessary for a standard depth of cut.

The du Mont Corporation further offers "Minute Man" collared bushings in sizes from ¼ to 1-9/16 in. at slightly higher cost than their regular bushings. These collared bushings facilitate locating the broach in the bushing, and make it unnecessary to locate the base of the bushing against the arbor press plate. The collar further retains the bushing in the bore. **T-4-6**

OVER FORTY YEARS OF FINE TOOLS

QUALITY—PRECISION—STANDARDS

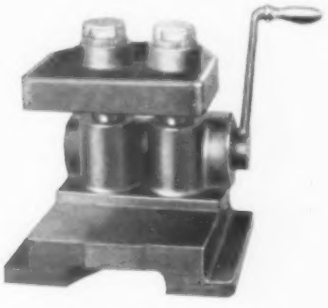
SPRING TYPE and RACK & PINION TYPE SIEWEK DRILL JIGS



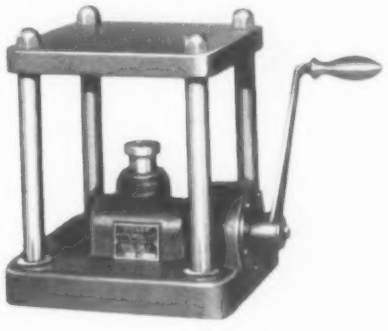
Model 4900
Size range of working area from 1½" x 2½" with a minimum opening of 2" and a lift of 1".

Spring Type Drill Jigs are made in 6 styles and in 84 sizes.

Rack and Pinion Type Drill Jigs are made in 7 styles and 77 sizes.



Model B-3 DRILL JIG
Size range—from 2¾" x 4½" with minimum opening of 3" and a lift of 1⅞" to 8½" x 29¼" with a minimum opening 11" and a lift of 2-3/16".



4 POST DRILL JIG
Size range inside posts for *width* of material is from 3¾" to 12¼" with minimum openings of 2⅜" to 6¾" and a maximum of 3⅝" to 8¾".



WE SPECIALIZE—
Siewek is the only manufacturer of a complete line of Drill Jigs both Spring and Rack and Pinion type—Fixture Clamps and Fixture Details. Immediate delivery.

Write for your copy of our new catalog today—it shows our complete line.

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2860 East Grand Blvd. Detroit 2, Michigan



Class discussion on application, design and maintenance of carbide tools.

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WENDT SONIS

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ON CARBIDE CUTTING TOOLS

INSTRUCTIONS IN LATEST CARBIDE CUTTING TOOL PRACTICE

New uses — new techniques are constantly being discovered for carbide cutting tools — practices which make for a better cutting job with less time, labor and expense. The Wendt-Sonis Advanced Training School packs into one week of comprehensive instruction all the latest *proven* carbide cutting tool methods and applications which can help do the job better at *lower* costs. Special instruction is devoted to proper maintenance of all types of carbide tools.

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W-S instructors are practical, factory men who know their subjects well from actual experience gained in solving the many cutting tool problems of industry.

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Learn by actual *doing* or *seeing* demonstrated, all the new ways of making carbide tools do a finer more efficient job.

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Gentlemen:

I am interested in more details about your Advanced Training School on Carbide Cutting Tools! Please send complete information.

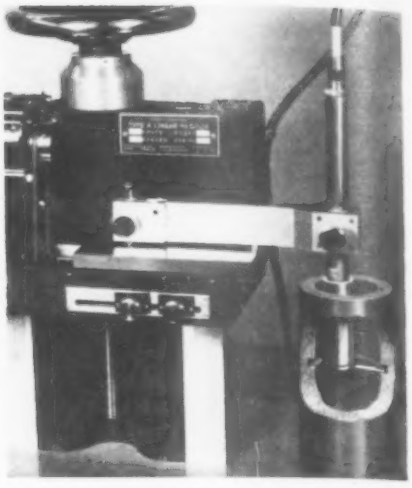
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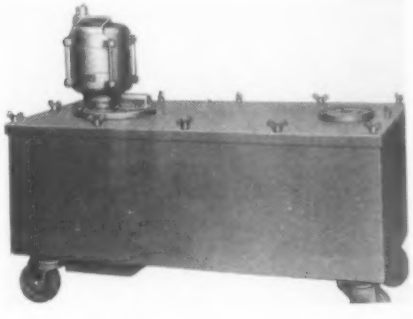
CITY STATE



Profilometer Tracer

A Tracer—Type 6B—for use with all Profilometer Amplimeters in taking surface roughness measurements on hard-to-reach surfaces is announced by Physicists Research Co., 321 S. Main St., Ann Arbor, Mich. The unit provides for measuring on internal grooves and slots; tracing axially in small holes; tracing both transversely and longitudinally in narrow slots and grooves and on gear teeth; and tracing on internal and external tapered surfaces.

In order to enter small holes and slots, the tracing point is located at the end of a narrow beam which projects horizontally from the bottom of the Tracer, and no skids are used. Because of this construction, the unit must be operated mechanically by a Pilotor, for attachment to which pivoted arm is provided. An illustrated bulletin giving full details is available on request. T-4-7



Explosion Proof Motors

Explosion proof polyphase motors in sizes ¼, ½ and ¾ hp, by the Ruthman Machinery Co., Cincinnati 2, Ohio, are now available for any Gusher Pump within this horsepower range. These motors are designed for use in hazardous locations and, having passed the Underwriters' Laboratory test "Class I, Group D", are available with Underwriter label when requested.

The photograph shows Model UL-7124-EXP installed on a totally enclosed portable tank. This unit—with ¼ hp explosion proof motor—was developed for pumping high volatile inks in the printing industry and illustrates but one of numerous applications in handling various liquids up to 10 SSU at 100 deg. F. T-4-8



Portable Tool Balancer

A Portable Tool Balancer, by Keller Tool Co., Grand Haven, Mich., is designed to suspend tools weighing up to 10 lb near the working area. Working range is 6 ft. Suspending the tool, rather than continuous pick-up and return, reduces operation fatigue, prevents damage to tools and tends toward increasing output. **T-4-9**



Camshaft Precisionaire

Said to permit a complete and almost simultaneous gaging of most critical dimensions and conditions of an automobile camshaft, a machine developed by The Sheffield Corp., Dayton, Ohio, checks six bearing diameters and two lengths of the camshaft with Airsnaps used in conjunction with a 5-column and a 3-column Precisionaire base instrument. The shaft is revolved manually to check for out-of-round, and also for concentricity of five bearings which is indicated by a variation in float position in an additional 3-column Precisionaire. Checking of two lengths is accomplished by additional air jets incorporated in Nos. 1 and 2 Airsnaps.

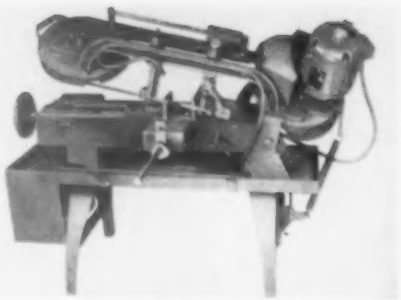
Runout of the oil pump drive gear is checked by a separate gaging unit consisting of a mating gear mounted on a ball slide and actuating a dial indicator.

The relief hole is checked for clear passage by playing a jet of air into the end, the stream of air being felt by the operator when the passage is unrestricted. A Sclerescope, mounted in front of the front gaging station, determines hardness while the camshaft is in gaging position. **T-4-10**

Wet Cutting System

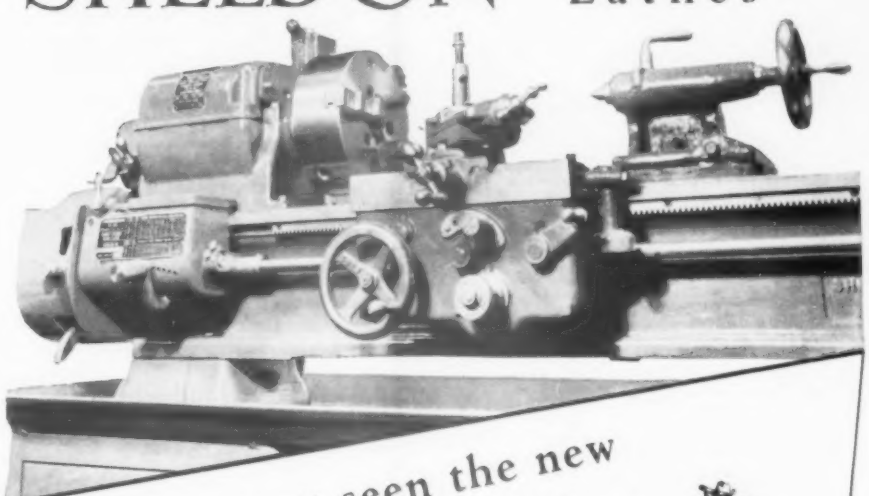
A self-contained wet cutting system, developed by Wells Mfg. Corp., Three Rivers, Mich., and similar to those used on Wells Models Nos. 8 and 12, is now available for the Wells No. 5 Utility Model Horizontal Metal Cutting Band Saw. Such flushing systems permit higher fpm cutting speeds and increase blade efficiency.

Portability of the machine is retained, inasmuch as the full area chip pan is



firmly mounted between the bed and legs. The complete system also includes fluid tank with centrifugal type pump-motor unit and a screened intake, as well as tubing and a conveniently located flow control valve. **T-4-11**

SHELDON Precision Lathes



Have you seen the new SHELDON Lathes . . .



. . . those built in the new SHELDON machine tool plant? Always good lathes, these new SHELDONS are even better, not only in design refinements but in extreme accuracy, greater work capacity for size, "sweeter" handling and actual beauty of finish. Only a set-up like the new SHELDON plant could build such lathes—a specially designed building, the most modern manufacturing methods, complete tooling with row on row of the finest, most modern manufacturing equipment.

From any angle a better lathe.

Make it a point to stop in at your SHELDON dealer's and see these new machine tools. Note their moderate prices. They are a revelation of what modern equipment and methods produce.

Write for Catalog

SHELDON MACHINE CO. Inc.

Manufacturers of Sheldon Precision Lathes • Arbor Presses • Visco Sheldon Vernon Horizontal Milling Machines • Vertical Milling Machines and Jig Borers • Shapers

4229 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U.S.A.



Here's what I hear from the boys who know *Firth Sterling* high speed toolholder bits—

They go for CIRCLE C in a big way! It's the top quality tool bit steel! *But its cost is negligible.* By increasing production even 5% —the resulting man and machine earnings completely eliminate the tool bit cost. And, it cuts materials many other high speed steels can't touch. You can't beat CIRCLE C.

There may be applications in your shop where Firth Sterling BLUE-CHIP (an 18-4-1 machining stand-by for many years) will do the work most economically and satisfactorily and where the top quality Circle C is not required. Or, if you want a still more moderately priced general purpose bit, Firth Sterling STAR-MO M-2 can fill the bill.

Whichever grade you require—if it's Firth Sterling, it's the best for your job.

Bulletin SL-2028 gives you the details on all Firth Sterling High Speed Toolholder Bits—write today for a copy.

Better yet, call your nearest Firth Sterling office for a Representative who can help you choose the right high speed toolholder bit for your particular job.



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In Canada: Chapat Engineering & Sales, Ltd., Hamilton, Ontario

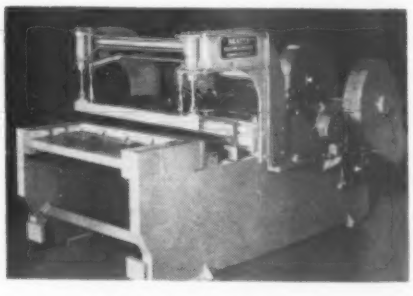


Overhead Chain Conveyor

Chain-O-Flex is a flexible chain conveyor packaged product for use where a constant flow of material or assembled products is needed. Quick assembly of any practical conveyor system pattern is a feature claimed since all parts are bolted together like an erector set. All corners are highly flexible and adjustable to any desired degree.

Variable speeds are obtained by adjusting the band wheel on the drive unit which will provide a 3:1 speed ratio. Multiple drive units may be used on extremely long systems.

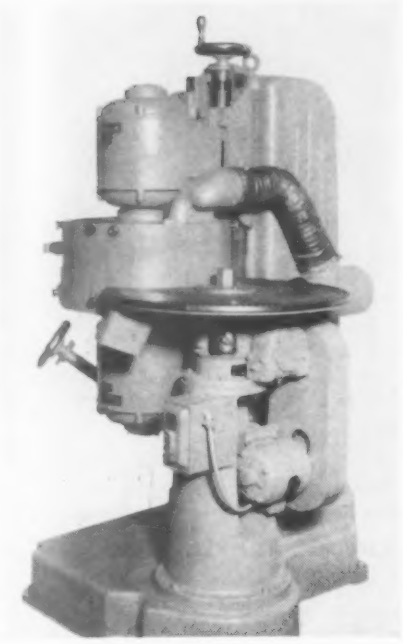
Manufactured by the Chain-O-Flex Corp., Franklin Park, Ill., this equipment is distributed exclusively by Industrial Equipment Co., 315 N. Ada St., Chicago 7, Ill. T-4-12



Multiple Punch

A horizontal Multiple punch, available in capacities from 50 to 300 tons, is announced by the Beatty Machine & Mfg. Co., Hammond, Ind. Built for multiple punching the flanges of long, wide sheets, design allows for punch tools to be mounted on varying centers across the ram face. The machine, which has frames of welded steel plate, is fitted with an air clamp device which holds the material down during the punching operation for gauging purposes. Stripping is accomplished by air cylinders which travel with the ram. Clutches are of the jaw type with motor drive V-belt to flywheel.

The following are specifications on the 200 ton machine illustrated: Distance between housings, 63 in.; Stroke, 6 in.; Stroke per minute, 28; Die space, ram back, 18¼ in.; Ram width, vertically, 10¾ in.; Ram length, right to left, 72 in.; Table width vertically, 9 in.; Table length, right to left, 72 in.; Depth of throat, 5 in. T-4-13



Vertical Spindle Grinder

Charles H. Besly and Co., 118-124 N. Clinton St., Chicago 6, Ill., announces a double vertical-Spindle Grinder designed for faster precision grinding of small parts. The machine grinds wet or dry and, with manual loading by a skilled operator, has a claimed output of 2,400 pieces per hour. With a hopper feed attachment the machine is said to produce 5,000 or more pieces per hour, depending upon the area of the pieces to be ground.

Listed as No. 905, the new grinder features quick convertability from one job to another by easy replacement of the feed wheel. Fast gravity loading and unloading is obtained by the horizontal position of the grinder's feed wheel. **T-4-14**



Self-Aligning Bearings

Boston Gear Works, Quincy, Mass., announces a Pillow Block and Flanged Cartridge designed to provide the advantages of self alignment and quick and simple installation with easy servicing. Both types are available for shafts ½ in. to 1¼ in. in diameter.

An oil-resistant seal of labyrinth design, integral with the bearing, provides a dirt-free lubrication chamber and permits unrestricted misalignment of the bearing. Bearing is prelubricated, with Alemite fittings for regreasing.

T-4-15



Safety Tool and Stamp Holder

An improved "Safety" adjustable Hand Tool Holder, by M. E. Cunningham Company, 169 E. Carson St., Pittsburgh, Pa., is now available in two models—HTF-1, with finger lever-type control for quick insertion or release, and HTS-2, with knurled adjustable screw-type control.

Designed to hold stamps or tools within the range of the holder, the device prevents injury to hands, and all holders may be used with square, octagon or round tools. Sizes range from ¼ to ½ in. through to ¾ to 1¼ in. The improved holder is constructed of aluminum casting which reduces weight, yet, more "meat" where needed is said to provide adequate strength even under severe usage. **T-4-16**



Dust chutes cause no interference with large pieces. Guard raises, or swings clear, to expose any part of belt. Platen in up-position provides flat working surface. Easily made into a buffing machine, for many jobs. With platen down, pieces are worked from under belt.

new!

Low cost! Portable! Takes little floor space! Does many metal-removing operations formerly requiring heavy, expensive machines!

DELTA® *Belt* Grinding, Polishing, and Deburring Machine



$130.75 without adjustable guards, dust chutes, motor, switch, or switch rod. Price subject to change without notice. Available in models to suit varying needs. See Bulletin AD569

Look for the name of your Delta distributor under "Tools" in the classified section of your telephone directory.

Can be used to do all this—and more!
- Clean out slots
- Remove flash in corners
- Remove fins
- Smooth up crowns
- Remove nibs
- Remove parting lines
- Chamfer corners

DELTA MILWAUKEE

You speed up flashing, grinding, cleaning, and polishing, with this new Delta *Belt* Grinding, Polishing, and Deburring Machine. You save time, labor, and material.

In this condensed unit on a welded steel stand, you get a production machine at low initial cost. With accessories to meet your particular requirements, it does hundreds of different jobs.

There are no set-up wheels to bother with; no grinding wheels to dress. Instead, you use coated abrasive belts that are inexpensive, long-wearing, quick and easy to replace.

The Delta *Belt* Grinding, Polishing, and Deburring Machine is carefully engineered for long, trouble-free service. Delta quality features assure you of that: Pre-loaded, lubricated-for-life ball bearings. Precision-bored bearing seats. Dynamically-balanced pulleys. All-around rugged construction. Delta Dust Collector available for use with this unit protects workers' health and expensive machinery.

Make metal-removing fast and economical. Put Delta *Belt* Grinding, Polishing, and Deburring Machines to work for you on your production line—and in your inspection department, to clean up imperfections on the spot.

Have your nearby Delta distributor show you this new machine. Send coupon for free Bulletin AD569.

Ask your distributor about easy time-payment plan!

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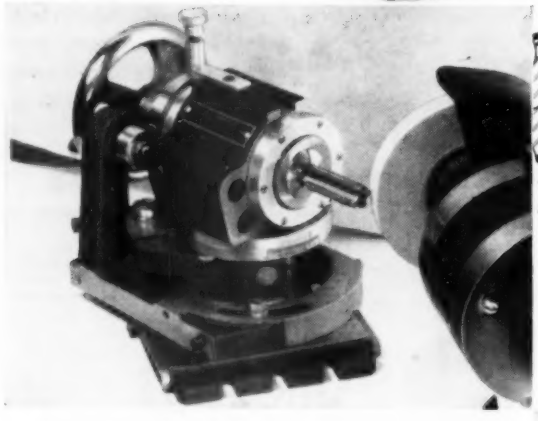
Manual Control Valve

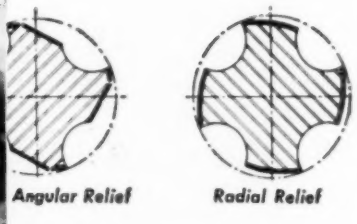
Saval, Inc., Los Angeles, Calif., announces a line of manually actuated, 4-position, dual pressure valves for use on accumulator-actuated high and low pressure presses employing water or oil as a service medium.

Incorporating the Saval "Shear-Seal" principle, these valves are designed for fast, one-hand operation. A single lever, said to require only 12 lb. to actuate at 5000 psi, permits the separate introduction of low pressure and high pressure fluid when moved through an arc of only 90-deg.

Throttling may be accomplished on the low pressure line and an intermediate shut-off position is provided, permitting all flow to be stopped with a minimum of handle motion. Furnished in 4 sizes from ¾ to 2 in. N.P.T., all for pressures of 7000 psi. **T-4-17**

Radially Relieved Cutters* are Better Cutters





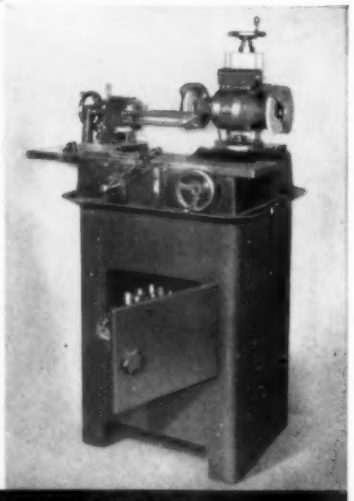
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* More support at cutting edge—Longer tool life.

DS RADIAL RELIEF GRINDER

Lower in cost, easier to operate, more compact, better engineered.

Radial relief grinds taps, step drills, boring bars, counterbores, profile mills and a variety of special cutters.





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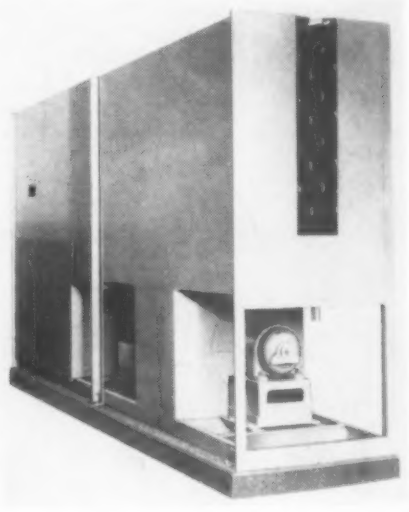


Layout and Inspection Plate

A precision ground plate 11 x 9 in. and cross ribbed on the underside for rigidity, by All American Tool & Mfg. Co., 1014 W. Fullerton Ave., Chicago 14, Ill., includes an illuminated magnifier and is adjustable to any angle and to any height up to 10 inches.

The magnifier has a 4½ in. diameter specially ground glass, with a 25 watt tubular lamp on each side are shielded to direct rays onto work being inspected.

The unit is designed for tool and die makers, engravers, etchers, laboratory technicians and others involved in precision work. **T-4-18**



Spotless Parts Dryer

A mechanical dryer for the spotless drying of metal parts, announced by Optimus Equipment Co., 225 Water St., Matawan, N. J., is designed to meet the needs of the plating industry for the drying of highly polished metal surfaces without water spots, stains or streaking.

The Optimus "Spotless" Dryers, as they are called, are designed to handle the drying of metal parts either on racks or monorail on a continuous production basis. Air for drying can be heated by steam, gas or electricity. **T-4-19**



Power-Wheel Unit

A pneumatic rubber drum, inflated at low pressures, is the basis of the improved Nu-Matic Grinder, a power-wheel unit for grinding, sanding or polishing curved, irregular and contour surfaces, made by Nu-Matic Grinders, Inc., 10304 W. McNichols Road, Detroit 21, Mich. The unit can be used on bench, portable or flexible shaft motors, and each drum is provided with an adapter to fit $\frac{5}{8}$-11 or $\frac{1}{2}$-13 thread power shaft. Size should be specified.

Standard abrasive bands, 5 in. in diameter and $3\frac{1}{2}$ in. wide in a variety of abrasive grits can be quickly changed from roughing to finishing. Changes or replacements are accomplished by releasing the air and then reinflating to work requirements. **T-4-20**



Rolling Pipe Threads

including ANPT and Dryseal with

REED RTD CO

CYLINDRICAL DIE THREAD ROLLERS

Thread rolling is a cold forging process that forms the thread by displacement of metal. It produces a uniform, smooth, precision thread at high rates of production.

Send us specifications of your requirements and let us supply you with complete information.

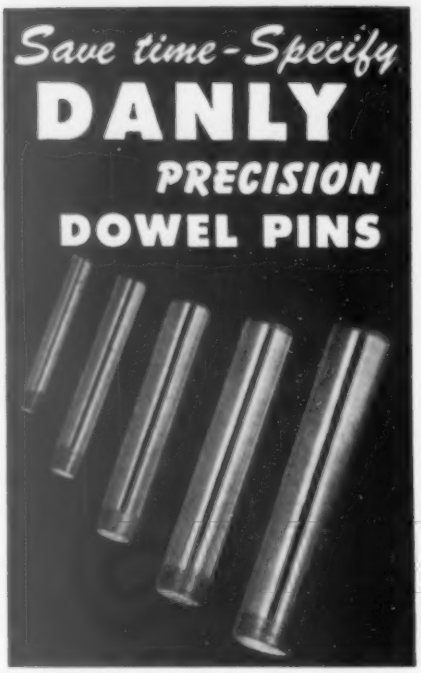
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HARDENED AND PRECISION GROUND—CAN BE DRIVEN WITHOUT UPSETTING

Wherever parts must be accurately joined or held together, you can depend upon Danly Precision Dowel Pins to save time. Because they're hardened, they can be driven in or out of holes without upsetting. They assure an accurate fit because they are precision ground to limits of 0.0001".

A WIDE RANGE OF SIZES are available in both standard diameters for new work and in .001" oversize for repair work. They are accurately marked and packed in substantial containers for your fast and convenient use.

SIMPLIFY TOOL, DIE, AND GAGE MAKING WITH THESE DANLY PRODUCTS

Hollow Set Screws—provide maximum tightness with shakeproof qualities—class 3 fit is Danly standard. Standard, self-locking knurled point, and knurled thread types available.

"Kwik-Klamp" Toggle Clamps speed handling of light work, eliminate T-bolts and clamps, C-clamps, screws and jacks. Versatile types and sizes with holding pressures from 300 to 750 lbs.

Die Springs—Two interchangeable types—one for medium pressure—high deflection, and one for high pressure—medium deflection work to best suit job needs.

Knurled Socket-Head Cap Screws—full range of sizes. Class 3 coarse or fine threads speed assembly work, insure precision fit.

Socket-Head Stripper Bolts made to close limits, insure better fitting and positive tightening without shearing.

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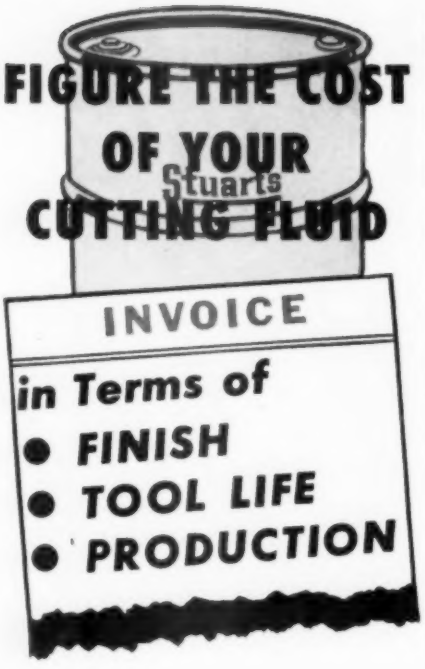


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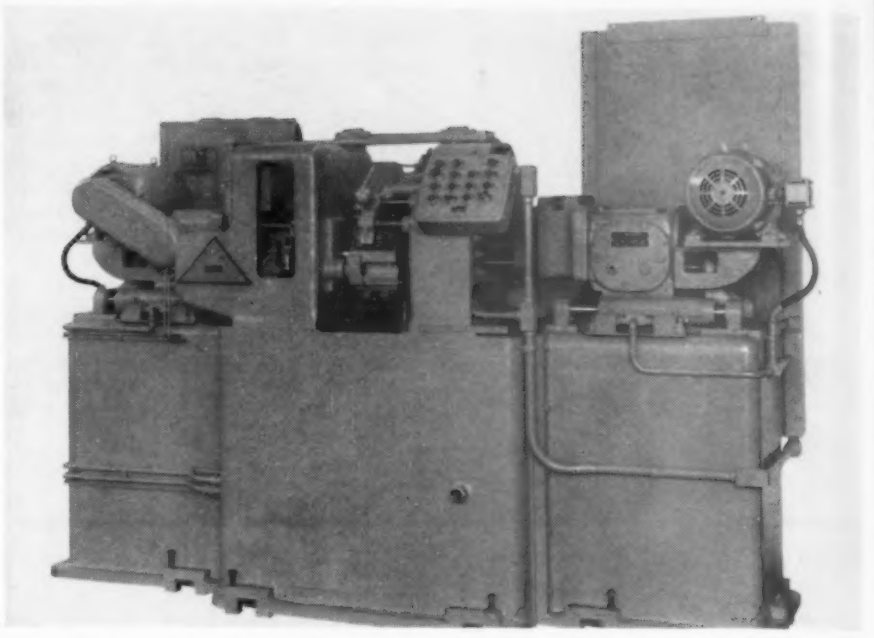
IT is *wise economy* to buy cutting fluids on a basis of performance rather than on a price basis. This is borne out by the case of a large screw products company in Chicago machining 11/16" round stainless steel types 303 and 440. Operations include forming, drilling and reaming on a New Britain-Gridley automatic screw machine. A number of different cutting oils had been used on this job until one was found that seemed to give relatively satisfactory performance. However, this product was replaced after the first trial with Stuart's Thred-Kut. Not only was there a marked improvement in finish, but *tool life was increased 3 to 4 hours and daily production was increased.*

The above case study is a typical example of how the best cutting fluid for the job will pay its original cost over and over again. D. A. Stuart Oil Company representatives preach the gospel of "Wise Economy." They can help you cut costs with cutting fluids best suited to your requirements. Ask for booklet, *Cutting Fluids for Better Machining.*

STUART *service goes with every barrel*

D.A. Stuart Oil CO.

2727-49 S. TROY ST., CHICAGO 23, ILL.



Two-Way Tapping Machine

A 2-way 8-spindle horizontal lead screw Tapping Machine, by LeMaire Tool & Manufacturing Company, 2651 So. Telegraph Rd., Dearborn, Mich., is primarily designed to tap four split sleeves, in automotive adjusting sleeves for steering rods, with automatic unloading of parts.

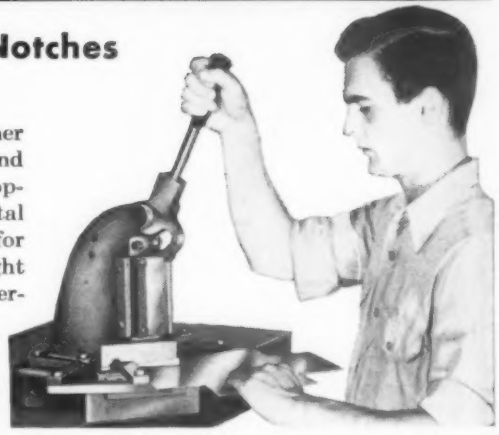
The machine consists of a fabricated center base supporting a 3-station trunnion and two cast iron end bases, each supporting a lead screw tapping unit carrying a 4-spindle tapping head.

A double holding fixture, at each of the three trunnion stations, holds two parts. A sliding guide holds the parts in place until hydraulically clamped at the second station, where they are tapped and unclamped. The parts are discharged via chute at the third station. Production claimed is approximately 480 pieces per hour. **T-4-21**

THE di-acro NOTCHER

Duplicates Precision Notches WITHOUT DIES!

The new precision DI-ACRO Notcher eliminates the need for punch press and dies on many production notching operations. It is also ideal for experimental work as it can be quickly adjusted for any size or shape notch. Many straight shearing operations can also be performed with this flexible unit.



CUTS CLEAN—NO BURRS OR ROUGH EDGES

The powerful DI-ACRO Notcher has an exclusive roller bearing cam design which provides a tremendous pressure with a small amount of effort. The precision-ground Vee-shaped ram and blades of alloy tool steel assure clean cuts and permanent accuracy.

LARGE CAPACITY. The DI-ACRO Notcher cuts 90° notches up to 6" by 6" in 16 gauge steel in one operation. Larger notches, and wider or narrower angles, can also be obtained.

SEND FOR 40-PAGE CATALOG. Gives full information on all six "DIE-LESS DUPLICATING" production boosters—DI-ACRO Benders, Brakes, Shears, Rod Parters, Punches, Notchers—with many examples of accurately duplicated parts.

DI-ACRO is pronounced "DIE-ACK-RO"

DI-ACRO PRODUCTION EXAMPLES

DI-ACRO DIE-LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.

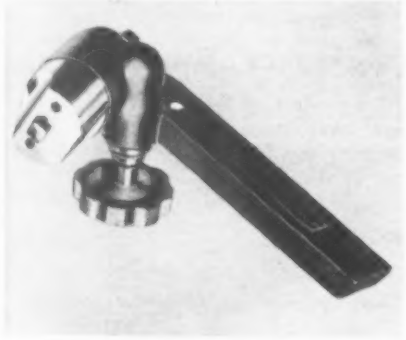
375 EIGHTH AVENUE, LAKE CITY, MINN.



Chambersburg Utility Hammer

Chambersburg Engineering Company, Chambersburg, Pa., announces a General Utility Hammer available in sizes from 50 to 500 pounds falling weight. The tool, which operates on air or steam, is designed to handle a wide variety of jobs from tool dressing to emergency forging of repair parts.

Where dies are employed, accurate work is claimed because of the integrated frame and anvil cast in one piece, which prevents sway. Long life, with reduced operating costs, is attained because of automatic cylinder lubrication and induction hardened piston rings. These features, together with an improved rotary-type valve directly connected to the throttle control, provide greater steam and air efficiency. **T-4-22**

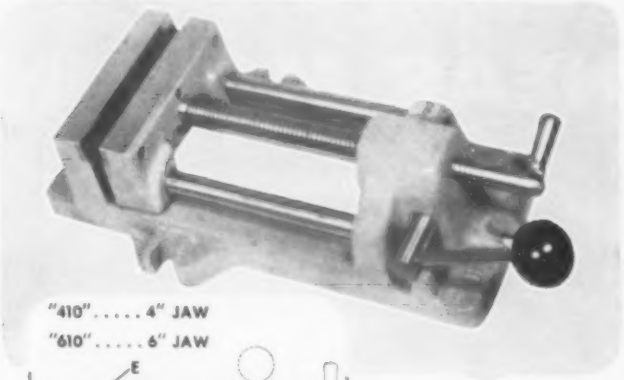


"Shaplane" Radius Tool

A versatile radius cutting tool—the Monarch "Shaplane" Radius Tool—is designed for cutting concave radii from about ½ in. minimum up to 6 in. The tool, which incorporates a worm and wheel to rotate the cutter, can be used on engine or turret lathes, shapers or planes. It will even turn the radiused raceways on ball bearing races and thrust collars. Outside of the innovation of the rotable cutter head, it functions as any lathe or planer tool. Fully explained in a folder, available on request from C. B. Teeter, 4770 Oakenwald Ave., Chicago 15, Ill. **T-4-23**

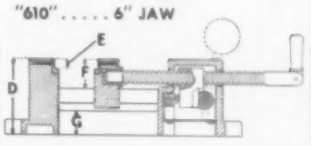
The JAWSET BY HARTMANN

ADJUSTABLE PRESSURE PRODUCTION VISE



"410" . . . . . 4" JAW

"610" . . . . . 6" JAW



Model	410	610
Jaw Width	4"	6"
Loading Range	5¼"	7"
Overall Length	12½"	16"
D	3½"	3⅞"
E	⅝"	¾"
F	1⅜"	1⅝"
G	1"	1⅛"
Vise Ship. Wt.	22 lbs.	35 lbs.
V-Block Ship. Wt.	2 lbs.	3 lbs.

Guide Bars, Eccentric Crank, and Threaded Nut hardened and ground for long wear.

PRODUCTION — After jaw is set in position, hundreds, thousands or millions of pieces may be run thru by the mere flip of a lever.
ADJUSTABLE PRESSURE — From lightest to two ton or better.
USABLE FOR LIGHT MILLING, DRILLING, BORING — (A tool room vise for all these operations).
JIG AND FIXTURE BASE — an inexpensive base designed especially for building in jigs and fixtures.
V-BLOCKS — obtainable at small additional cost.

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Special Luminosity Features:

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3) Permits examination and checking of the surface of opaque objects.

Comes complete with objectives for magnifications 10, 20, 50 and 100X. *Also*, a graduated rotary screen with hairline cross for degree measurements can be furnished.



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LINEAR MOTIONS



BALL BUSHING

THE COMMERCIAL GRADE SERIES B

Sliding linear motions are nearly always troublesome. Thousands of progressive engineers have solved this problem by application of the Precision Series A Ball Bushing.

The low-cost Commercial Grade Series B bearing is now added to the Ball Bushing line and offered to original equipment manufacturers. This ball bearing has been developed for support of linear motions in competitively priced, volume produced products where super precision is not essential. Alert designers can now make tremendous improvements in their products by using Ball Bushings on guide rods, reciprocating shafts, push-pull actions, or for support of any mechanism that is moved or shifted in a straight line.

Competition is returning. Up-to-date engineering can be *important to you!*

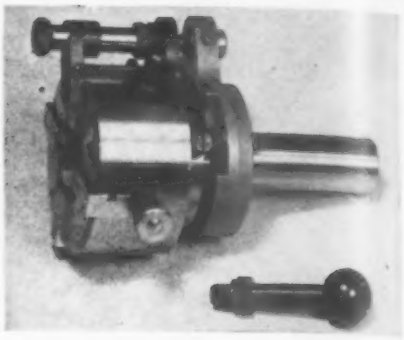
- **LOW FRICTION**
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NOW AVAILABLE for ¼", ½", ¾" and 1" shaft diameters. Additional sizes to follow. Write for new literature covering both the Series A and Series B Ball Bushings and the name of our representative in your city. No obligation.

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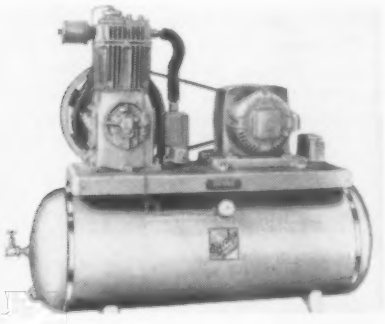
PROGRESSIVE MANUFACTURERS USE BALL BUSHINGS — A MAJOR IMPROVEMENT AT A MINOR COST



Self Opening Die Head

The Geometric Tool Co., of New Haven 15, Conn., announces the aligning shank Geometric Style DS Convertible, Self Opening Die Head, which has a built-in aligning shank. This aligning shank is said to provide means of quickly centralizing the die head with work when machine misalignment exists.

Overall length of the tool is practically the same as the standard Style DS Convertible Die Head, and all other specifications are the same. However, this head reduces overhand and maintains die head rigidity and initial machine capacity, thereby permitting shorter overhang of other tools in a turret. **T-4-24**



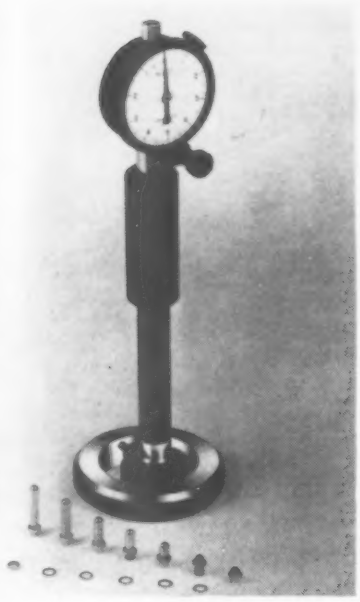
Two-Stage Compressor Units

Six models of 2-stage Air Compressors have been added to the spray painting and finishing equipment line of the Binks Mfg. Co., 3114-40 Carroll Ave., Chicago 12, Ill. The units are designed to supply compressed air for spray painting as well as air at higher pressures than those normally used for spray finishing. In this way, the same compressor—built for 200 psi—serves as a source of air for various uses. Tanks are tested to 300 lb., with standard pressure setting 160 to 200 lb. **T-4-25**

Paint Stripper

It is claimed that the late types of urea melamine, vinyl, and bis-phenol finishes of both the air dry and baked type can be stripped readily in less than five minutes time with Quaker Strip 15, developed and sold by Quaker Chemical Products Corp. of Conshohocken, Pa.

This product is said to be applicable to both the new and old type finishes so that the necessity of maintaining a special stripping bath for either class of work is unnecessary. **T-4-26**

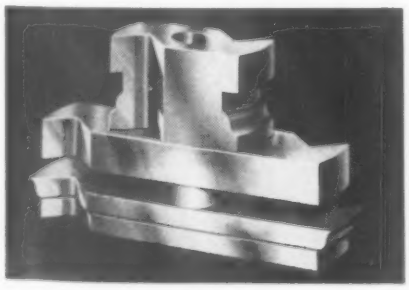


Large Nilco Bore Gages

Engineering improvements in Nilco Dial Bore Gages, by Nilsson Gage Company, Inc., Poughkeepsie, N. Y., are said to provide faster setting with maintained accuracy over extended periods of time.

Five gages cover a range from $\frac{7}{8}$ to 12 in. and are standard with any indicator graduated in tenths. However, they can be adapted with any other type of indicator of any graduation, make or model of the American Gage Design Standard class.

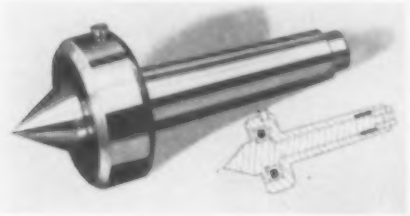
The range extension consists of three parts-extensions; washers; and nuts. For approximate adjustment to specific dimensions, the correct range extensions and washers are selected and the bore gage is then set in a master ring, as illustrated, or to gage blocks. The final setting for zero reading in the first quarter of the dial is then made by simple adjustment of the indicator. Because of design, the entire setting time is said to be cut to a minimum. **T-4-27**



Two-Wing Cutters

Production type two-wing cutters, said to have all the operating advantages of costly circular or involute—flattened arc, cam-profiled—relief, are now available at moderate prices from Boice-Crane Co., 934 W. Central Ave., Toledo 6, Ohio. They are being marketed as Tru-Form Relief Safety Cutters.

By the principle involved, the shape is machined into the cutter on an arc to assure clean cutting without burning and to hold the true original shape and dimensions right up to the last sharpening. **T-4-28**



Ball-Bearing Live Center

A precision Live Center, by the South Bend Lathe Works, 417 E. Madison St., South Bend 22, Ind., has been designed to provide the strength and rigidity required for heavy roughing cuts, and the accuracy for fine work and high speeds. The revolving center is made from electric furnace tool steel heat treated to a hardness of 61 to 65 Rockwell C.

The center point shaft extends through the taper shank and is supported by bearings at both ends. A specially designed precision ball bearing carries both radial and thrust loads, and center point whip is eliminated by a rear pilot bearing. All parts are interchangeable and replaceable.

The center is available in two sizes: the smaller having a No. 3 Morse Taper shank. **T-4-29**

Faster Production IMMEDIATELY!

WITH POSSONS POSITIVE PUNCH PRESS SAFETY DEVICE

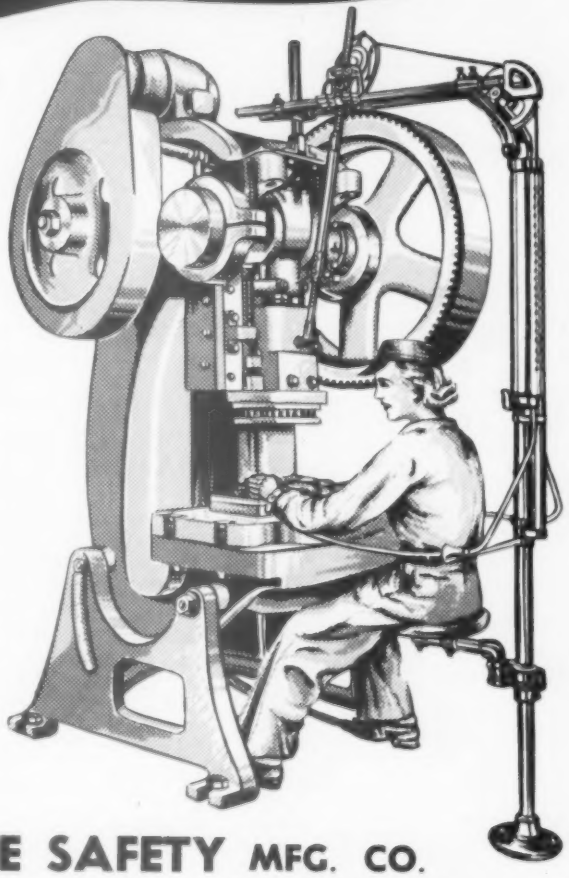
No interference. Stampings handled easily and quickly. Operator's hands are removed from danger area with smooth, positive action. Gives operator confidence. Allows him to feed to dies as fast as he can operate foot treadle.

Ram connection attached below any possible breaking point. If for any reason the press repeats the hands will be drawn to safety.

For punch presses, toggle presses, drop hammers and embossing presses.

Accepted everywhere as the best means of increasing output and protecting the operator. More than 22,000 in daily use.

Write *today* for complete Catalog illustrating the various types of Possons Devices, showing how easily they can be attached to *your* presses.



THE POSITIVE SAFETY MFG. CO.
4407 Perkins Avenue • Cleveland 3, Ohio

POSSONS POSITIVE SAFETY DEVICE

Abrasion Testing Set

Model No. 100-109 Abrasion Testing Set, in the line of standard rub-wear abrasion testers by Taber Instrument Corp., 111 Goundry St., North Tonawanda, N. C., incorporates their rotary abrading action on a 4 in. specimen. The wear results from alternately rubbing the flat faces of two resilient Calibrase wheels over the surface being tested. A range of standardized abrasive wheels are available for testing all types of surface finishes, including electroplate, porcelain enamel, organic coatings, leather, glass, plastics and woven textile fabrics.

Features include improved suction pump with vertical dust receiver with



swinging nozzle fully adjustable for any thickness specimen. The control unit is equipped with a built-in variable transformer, for adjusting the speed of the suction turbine motor to suit different materials. An adjustable timer provides a test period of 1000 cycles, or less, and then automatically shuts off the power, permitting the operating technician to be otherwise engaged. **T-4-30**



Floor Model Electric Furnace

A floor model Electric Furnace, designed to give the utmost in temperature control, is announced by the K. H. Huppert Co., 6830 Cottage Grove Ave., Chicago 37, Ill. Designed specifically for tool and die work, hardening and drawing—and, in the chemical laboratory, for ash analysis—the furnace is said to afford to other applications practical heat control over the entire range from room temperature up to and including 2000 deg. Fahrenheit.

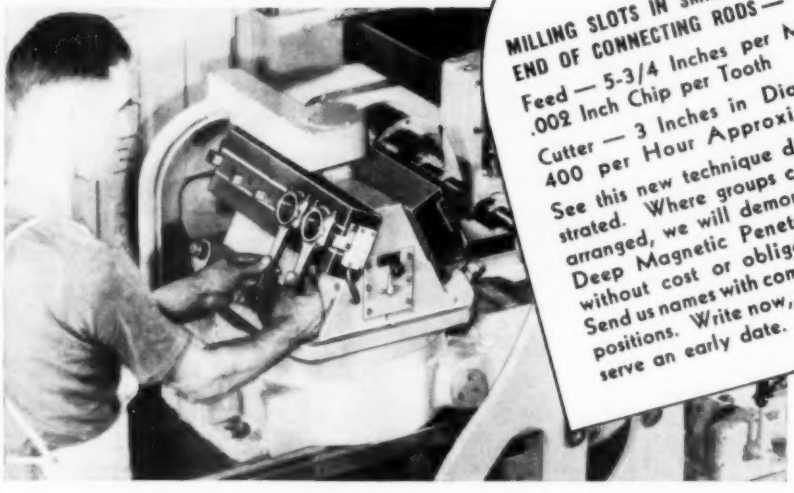
This furnace—the No. 11 FM Special—has two sets of heating elements. The top and bottom comprise one set, with the two sides making up the other element. Each set is controlled by one of two Huppert Infitrols, with the temperature governed automatically by the third control, a Capacitrol. With this unit, it is claimed that it is possible to control temperatures as low as 100 deg. F with the same accuracy as higher temperatures are ordinarily controlled. **T-4-31**

Lubricant for Bed-ways

Way Lubricant D, Developed by the Deacon Laboratories of The Texas Co., is designed for use on all kinds of ways—hardened steel, chilled cast iron or the new laminates—and is said to eliminate the chattering and jumping effects that occur at the beginning of the tool stroke.

Compounded with special additives, it is said that the new product will not squeeze or press out, either when the machine is in motion, or standing still. Thus, the oil film on the way remains constant and desired precision may be maintained. **T-4-32**

DEEP MAGNETIC PENETRATION



MILLING SLOTS IN SMALL END OF CONNECTING RODS—
Feed — 5-3/4 Inches per Minute
.002 Inch Chip per Tooth
Cutter — 3 Inches in Diameter
400 per Hour Approximate.
See this new technique demonstrated. Where groups can be arranged, we will demonstrate Deep Magnetic Penetration without cost or obligation. Send us names with company positions. Write now, to reserve an early date.

A NEW *Production* WORK HOLDING TECHNIQUE

Save hours of costly tedious clamping and unclamping on production milling operations with this new Power-Grip holding technique.

Deep-penetrating magnetic poles, the full length of the Viking Chuck, provide power that holds work securely against high speed machining cuts.

Get the complete story today on how to eliminate expensive fixtures and simplify work holding. Write for the new 1949 edition of Magnetic Holding Methods.

Send prints and specifications for estimate on Power-Grip Holding for your Production Jobs.

ROCKFORD MAGNETIC POWER-GRIP CHUCKS

ROCKFORD MAGNETIC PRODUCTS CO. INC.
1304 18th AVE. ROCKFORD, ILLINOIS



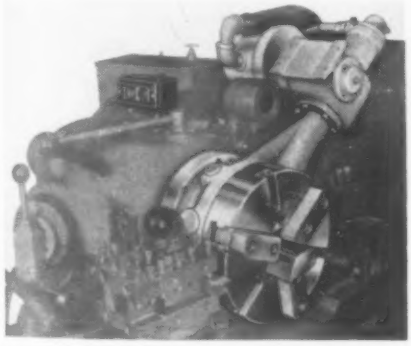
High Speed Control Valve

A solenoid-actuated air control valve, which uses the air it controls for its operation, is announced by The Bellows Co., Akron, Ohio. The valve consists of a cast bronze body incorporating a single air inlet, suitable electrical terminals, and a cylinder in which floats a light weight piston. The latter engages and shifts a four-way shear-flow air valve.

The caps enclosing each end of the cylinder hold small 8-volt solenoids whose plungers, operating through only 1/32 in. of movement, release the full pressure of the air supply line to drive the light weight piston and thus shift the four-way shear-flow valve in the desired direction.

The valve will operate on 5 to 150 lb air line pressure and, in speed of operation, is said to exceed 2200 movements per minute with the heat generated scarcely noticeable to the touch even after sustained operation.

Compact and completely enclosed, the valve is said to operate submerged, or covered with coolant, chips or dust. Available in ¼ in. and ⅜ in. port sizes and comes complete with a special transformer to reduce normal line voltage to the required eight volts. **T-4-33**



"Air-O-Torque" Chuck

The Whiton Machine Co., New London, Conn., announces the "Air-O-Torque" Chuck, a heavy duty power chuck designed to combine the best features of both an air operated chuck and power wrench operated chuck. A center hole allows feeding stock through center of the chuck.

This chuck has a housing which is attached directly to the lathe head. The lathe spindle extends through the housing and is attached to the chuck; thus, the housing remains stationary while the chuck is free to move with the spindle.

Operation is similar to regular gear scroll chucks with an air motor driving the pinion. This engages the scroll, causing jaws to close or open. Significant is the statement that, immediately upon stopping the machine, the scroll can be engaged by the pinion in the "Air-O-Torque" Chuck, regardless of the chuck's position on the spindle, and jaw action started. This eliminates turning chuck to desired position.

Power for operation of the chuck, which can be applied to any machine allowing the necessary clearance, is supplied by an air operated motor providing ample pressure to insure positive grip at all times. The desired gripping capacity can be attained by a valve adjustment which controls the amount of air pressure used in operating the air motor. **T-4-34**

Turn to page 82 for Handy Tools of Today coupon.

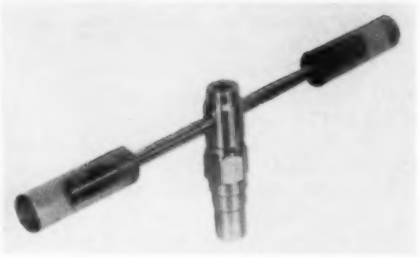


Stud Driver and Extractor

This combination stud driver and extractor helps to step up production, speed maintenance and repair work, without marring threads either in driving or extracting.

With shift control pin set in upper (driving) position, the "Bi-Way" studder operates as a normal collet type stud driver, but with these added features:

(1) Stud depth into collet is fully adjustable without disassembly of tool. Thus each stud is driven to proper depth, leaving exact projected length desired.



(2) Extension drive, inserted in torque wrench hole, permits deep driving or shoulder driving wherever space is insufficient for use of standard handle bars.

(3) Standard collet may be replaced with any other, within range of studder, in 30 seconds.

(4) All parts are sealed against dirt and dust.

(5) Locked up assembly prevents loss of adjustment.

(6) With handles removed, studder becomes power tool for use with impact, air, or electric wrench.

With shift control pin set in lower (pulling) position, the studder will extract any stud able to withstand the torque necessary to release it. Clamping action of collet increases in direct proportion to the torque required to start the stud. A grab of a thread length equal to one-half the diameter of the stud is sufficient.

Distributed by Air Associates, Incorporated, Teterboro, N. J. T-4-35

A. MILNE & CO.
(ESTABLISHED 1887)

Q WHAT IS HOLLOW DIE STEEL?

A Hollow die steel is quality tool steel in hollow (tubular) form.

Q WHAT GRADES CAN HOLLOW DIE STEEL BE FURNISHED IN?

A Any standard grade of tool steel.

Q WHAT GRADES IS HOLLOW DIE STEEL STOCKED IN?

A The toolmakers GREAT THREE grades:

1. MILNE'S HIGH PRODUCTION HIGH CARBON HIGH CHROME (Air Hardening Type)
   C 1.55 Cr 11.50 V 1.00 Mo .75
2. MILNE'S AMCOH OIL HARDENING NON-DEFORMING
   C .92 Mn 1.20 Cr .50 W .50 V .20
3. MILNE'S ORANGE LABEL WATER HARDENING STRAIGHT CARBON
   Carbon 1.00 - 1.10

Q WHERE IS HOLLOW DIE STEEL STOCKED?

A In A. Milne & Co.'s eight (8) warehouses located in

NEW YORK, CHICAGO, PITTSBURGH, SAN FRANCISCO, CLEVELAND, PHILADELPHIA, BOSTON, NEW BRITAIN

COAST TO COAST AVAILABILITY FOR THE TOOL ENGINEER

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America's Leading Tool Specialists



Air Presses

Paragon Metal Products, 844 West Adams St., Chicago 7, has recently announced two air presses designed to increase production on staking, press fit assembling, light stamping, marking and similar successive operations.

The press features a guided ram which assures accuracy by maintaining relative position to tools mounted on base; instant ram return for high speed production; four inch side thrust resisting bearing and a base with large ground surface area to facilitate fixture mounting.

The Paragon many-purpose press comes in two models. Model AP-1 has a cylinder with a 4 in. bore and a power factor of 12.56 times line pressure. The cylinder of Model AP-2 has a 5 in. bore and a power factor of 19.63 times line pressure.

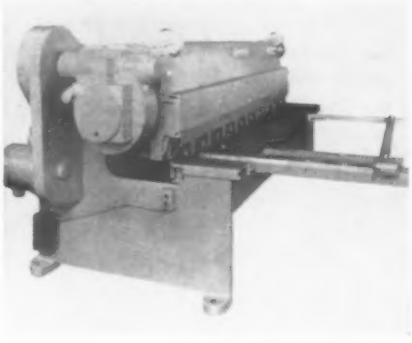
The following specifications are the same for both models. $2\frac{1}{2}$ in. stroke, $\frac{3}{4}$ in. ram, 6 in. depth of throat, 7 in. "table to ram" height. T-4-36



Aluminum Welding Alloy

The joining of thin aluminum has always presented a problem to production welders who require an alloy that will not warp or distort the aluminum surfaces. A new development of Eutectic Welding Alloys Corp., 40 Worth St., New York 13, called Eutecrod 900X, reportedly solves these difficulties by joining thin aluminum at temperatures below melting point of aluminum with greater fluidity than attained by aluminum brazing.

The rod is available in $\frac{3}{64}$ and $\frac{1}{32}$ in. in coil form. It bonds at 900 deg F and remelts at 950 deg F. It has a tensile strength of 30,000 psi. Direct contact of the heat source is not required so that warping or melting of base metal is avoided. **T-4-37**



Steel Squaring Shears

A line of Columbia steel squaring shears, recently announced by Columbia Machinery and Engineering Corp., Hamilton, Ohio, feature speed and accuracy of gauge setting, as well as other claimed points. Ease of operation is aided by motor-operated precision back gauge, solenoid-operated clutch controlled by a movable foot switch, and low overall height. Welded rolled-steel construction affords greater strength with reduced weight, permitting use of lighter, more economical foundations.

The shaft and worm of the shears are machined in one piece from high-alloy chrome-nickel steel, and the worm gear is special aluminum bronze with a tensile strength of 60,000 psi. The high-carbon, alloy-steel clutch, with six jaws, is bolted to the web of the worm gear and operates on the large squared end of the eccentric shaft, insuring a positive, rigid driving connection. The clutch is actuated by an electric solenoid, permitting operation by means of a convenient portable foot switch, and the drive and clutch operate in an oil-tight, dust-proof housing of ample size to assure rapid heat dissipation and prevent oil churning losses. **T-4-38**

Grinding Wheels Reduce Diamond Wheel Use

A method of coating each grain of a grinding wheel with a microscopically thin shell of carbon in an isotropic vitrescent form is announced by the Mansco Grinding Wheel Company. This process, known as the Buxite process, makes wheels highly effective for grinding carbide tools and other super-hard alloys.

Fast cutting is accomplished with light passes that generate little heat, thereby preventing checking and cracking of the tool. The need for diamond wheel grinding is greatly reduced, it is stated.

The patented grinding wheels are available through the Mansco Grinding Wheel Company of 2164 East 36th St., Cleveland 15. **T-4-39**

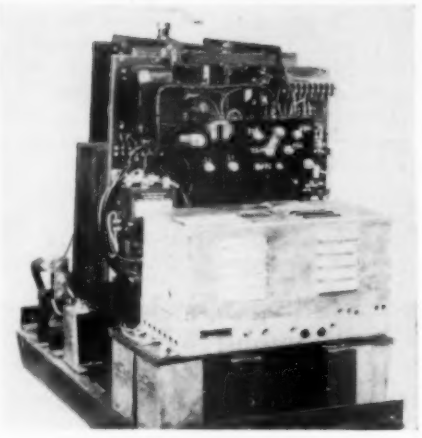


High Frequency Welder

Approval for the Sureweld Gasarc high frequency welder made by the National Cylinder Gas Company, Chicago, was granted recently by the Federal Communications Commission.

It is claimed that, regardless of working or weather conditions, the welder remains on the assigned frequency of 27,120 kilocycles. It causes no communications interference by either fundamental or harmonic radiation.

An arc starting procedure, labeled "touch start control," provides automatic "cold" starting. The electrode is contacted with the work at the point where the weld is to begin. The welding operator can locate the starting point of the weld accurately because he can make this contact with his helmet raised.



Touching the electrode to the work energizes a control circuit which turns on the high frequency current. Then, after lowering his helmet, the operator withdraws the electrode. This automatically turns on the welding current and establishes the arc. Since no welding current will flow while the electrode is in contact with the work, sticking of electrodes is avoided. Both the high frequency and welding currents are shut off automatically when the arc is broken. To re-start the arc, the same procedure is followed.

Complete information on the newly approved equipment may be obtained from the National Cylinder Gas Company, 840 North Michigan Ave., Chicago 11. T-4-40

WOODWORTH

Cone Lok JIGS





MINNIE JIG—for small work in 2 sizes: 1″ x 1″ and 1″ x 2″ working area.

STYLE 3—up-clamp type for controlled depth of machining; sizes from 4″ x 6″ to 9″ x 12″.

STYLE 1—most popular design for average work; sizes from 2″ x 4″ to 6″ x 8″.

STYLE 4—engineered for larger work in sizes from 5″ x 5″ to 9″ x 30″.

ALL STYLES EQUIPPED WITH FAMOUS WOODWORTH "LIFE TIME" LOCK —ALL SIZES CARRIED IN STOCK

ACCURACY YOU CAN TRUST

WOODWORTH

N. A. WOODWORTH CO. · 1300 EAST NINE MILE ROAD · DETROIT 20, MICHIGAN

PRECISION GAGES · DIAPHRAGM CHUCKS · CONE-LOK JIGS · PRECISION PARTS



Hydraulic Lift Truck

Recognizing user preference for (1) sit-down truck operation, (2) low mast heights with high free-lifts, and (3) the desirability of using truck attachments which are hydraulically operated, the Philadelphia Division of The Yale & Towne Manufacturing Company announces a line of electric trucks with exclusive two-stage hydraulic lifting by means of the ram-within-a-ram principle.

Called the Lift-King electric line, the new trucks are companion models to the gasoline-powered equipment also now being introduced by Yale. They will likewise supplement the existing sprocket-and-roller-chain designs.

In the first available series of Lift King electric trucks, a "free-lift" of 66 in. (i.e. the load lift before the telescopic mechanism begins to extend) permits the truck to tier goods inside freight cars and street trucks, and in low headroom spaces. This model can reach 130 in. from the floor, can carry up to 6,000 lb, and has an overall collapsed height of only 83 in. A second series has an overall collapsed height of barely 68 in., a free lift of 51 in., and a total reach of 100 in. T-1-41

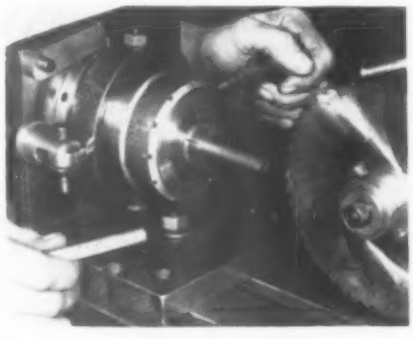


Low Cost Thy-Mo-Trol Drive

A low-cost Thy-mo-trol drive, announced as available from stock by General Electric's Control Division, utilizes a simplified half-wave circuit to provide d-c flexibility from a-c power. Known as the Type H1, and furnished in ratings through ½ hp, it is specially designed to provide—by the turn of a knob at a single control station—smooth stepless speed control on small lathes, grinders, drill presses, conveyors, pumps, packaging equipment, and paint and varnish mixers.

The drive operates from 220-volt, 60-cycle a-c, has a 20-1 speed range from 1725 to 86 rmp and is said to operate efficiently in ambient temperatures from 50 to 104 deg. F. It is furnished in either the non-reversing or the reversing type, the latter being equipped with a separate magnetic reversing switch.

Additional information is contained in Bulletin GEA-5179, available to THE TOOL ENGINEER readers from the General Electric Co., Schenectady 5, N. Y. **T-4-42**



Collet Chuck

The Goodwin Manufacturing Co., 10 E. Broadway, Cuyahoga Falls 22, Ohio, announces an improved quick-acting Collet Chuck, suitable for use on milling machines, that can be mounted on an index plate in vertical or horizontal position for semi-automatic milling and slotting operations.

Utilizing a multiple leverage principle and the cantilever action of hardened steel fingers, the chuck is said to provide a positive vise-like grip on the workpiece. Chucks for use on milling machines are available with either 1 in. or 2 in. capacity. **T-4-43**





There's a
MILFORD DUPLEX HACK SAW BLADE
for every hand-cutting need!

THE ONLY HAND HACK SAW BLADES WITH EASY STARTING TEETH

to give you these advantages

- Starts cut at any angle
- Teeth will not catch on ridges
- No scraping to begin cut
- Materially reduces cutting time
- Will not slip off cutting line
- Wear distributed full length of blade

No matter what you need to cut . . . or how . . . or where . . . you'll find that MILFORD'S know-how . . . accumulated in over 70 successful years of exclusive saw manufacturing experience . . . has produced the *right* blade for the job . . .

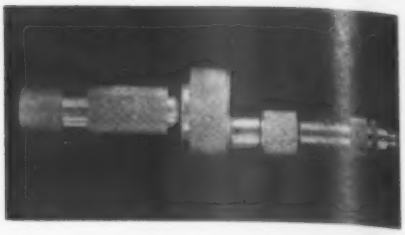
Flexible Standard Steel	Green Label
All-Hard Standard Steel	Yellow Label
Safety Standard Steel	Brown Label
All-Hard Rezistor	Orange Label
Flexible Rezistor	Silver Label
Tungsten High Speed Steel	Red Label

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PROFILE AND BAND SAW BLADES
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THE HENRY G. THOMPSON & SON CO.
Saw Specialists Exclusively for over 70 Years
NEW HAVEN 5, CONNECTICUT, U. S. A.



Step-Up Handpiece Increases Grinder Speed

Applicable to all Wyco grinders, older as well as latest models, multiple and single speed, Wyco's No. 1300 step-up handpiece multiplies the speed of any of these machines three times or better. Using No. 1 to No. 5 shaft, and replacing the old standard handpiece, the unit by means of gear steup, speeds the work to 5,000 rpm or higher, with ¼ in. mounted wheels—not only for carbide cutters but for rotary files, mounted grinding wheels, abrasive rolls, and many other applications. On standard 3600 rpm single speed grinders it is claimed that the operator can now get over 10,000 rpm, so that small mounted grinding wheels can be used at a much more satisfactory speed. Collets ¼ in. or ⅛ in. fit this new handpiece. For carbide cutters the No. 1300 handpiece is giving speeds up to 33,000 rpm.

Any older Wyco machine from ⅓ to 1½ hp can be modernized with the new step-up. Further details may be had by addressing Wyzenbeek & Staff, Inc., 838 W. Hubbard St., Chicago 22. **T-4-44**



Air-actuated Backstand

The Hammond Model 3-A Air Backstand, designed for heavy production grinding or polishing with abrasive belts, has an air-actuated cylinder which automatically maintains correct belt tension and immediately compensates for a fraction of an inch of belt stretch. Difference of materials require different belt tension and, after correct tension is determined, the operator merely sets the pressure regulator valve.

The Model 3A is of heavy cast-iron construction except for the stainless steel 12 in. diameter 7 in. face idler pulley, the latter diametrically balanced and running on sealed ball-bearings. Fully described in literature available from Hammond Machinery Builders, Inc., Kalamazoo 54F, Mich. **T-4-45**



Jaw Clamp

The J & S jaw clamp is designed for holding a wide variety of work-pieces quickly and firmly against the face plate or table of a machine. No part of the clamp is higher than 15/16 in., making it possible to pass over the whole clamp when holding work 1 in. high or more. The full surface of work 3/8 in. high or over may be machined as illustrated in the photograph because the jaw is only 23/64 in. thick. This clamp facilitates controlled centering adjustment on the clamped work-piece. It eliminates secondary operations.

The J & S jaw clamp can be used in machining operations on lathes, planers, milling machines, drill presses and other machine tools, as well as special production machinery. Since the clamp does not protrude above any part of a work-piece over 3/8 in. thick, it cannot interfere with the reading of the indicator dial of vertical boring and milling machines.

Manufactured by J & S Tool Co., Inc., 477 Main St., East Orange, N. J. **T-4-46**



Solid Carbide Cutters

The Severance Tool Company of Saginaw, Mich., are introducing a series of carbide cutters known as "Carbo-Mills", which will have 1/8 in. diameter shanks and are made of solid carbide in one piece—cutting heads and shanks being integral.

There are twelve different shapes in the series, to meet the widest range of applications for this size mill. These Carbo-Mills are recommended for the production deburring and machining of parts made from materials that are abrasive, or tough, or having hardness ranging up to 60 Rockwell "C".

Further information can be obtained by writing to Severance Tool Industries, Inc., 728 Iowa St., Saginaw, Mich. **T-4-47**

Power Gaging Handle

Faster inspection of internally threaded parts and reduced operator fatigue is now claimed with a power-driven gaging handle just announced by the Taft-Peirce Mfg. Co., Woonsocket, R. I.

With this inspection tool, manual rotation of a gage is eliminated, as the gaging handle mechanically screws the gage into, and out of, the work at a speed of four rps. Immediate reversal or automatic disengagement of the drive is obtained by a slight change in the applied pressure. **T-4-48**





You know that Multiple Drilling slashes production costs. But do you know that the

THRIFTMASTER *"Universal"*

IS THE

Highest Quality

• • •

Lowest Price

2-6 Spindles from $158.00 Immediate Delivery

UNIVERSAL DRILLHEAD

TWENTY-FIVE YEARS of drillhead engineering experience is built into the rugged power of Thriftmaster heads. Quantity production, combined with modern equipment and skilled craftsmanship result in minimum prices. Check these important features:

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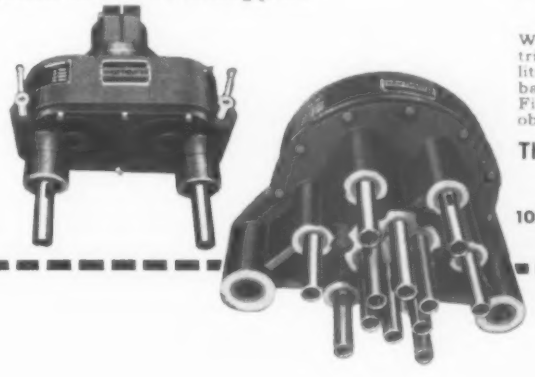
The superior construction of these versatile tools marks them as the outstanding investment for your present and future drilling jobs.

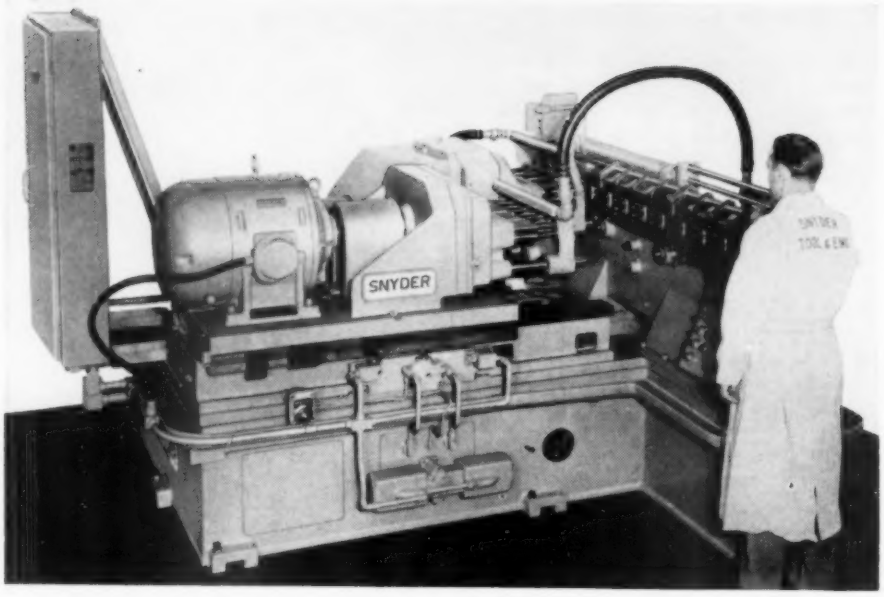
- **Adjustable to any hole pattern**
- **Fits any drill press**
- **Close center distance Settings**
- **Maximum flexibility**
- **Proven performance**
- **Long life at full rated capacity**

Write for name of our distributor in your area and for literature on Thriftmaster full ball-bearing Adjustable or Fixed Center Drillheads. No obligation, of course.

Thriftmaster Products Corporation

1038 N. Plum St., Lancaster, Pa.



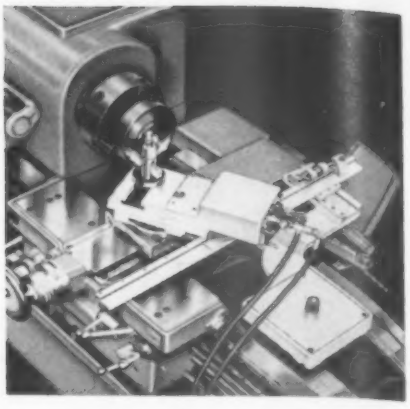


Drilling, C'sinking and Tapping Machine

A 16-spindle drilling, counter-sinking and tapping machine said to reduce the work cycle to 16 seconds on processing automotive upper control arm assemblies, and which cuts floor space to 25 percent of former requirements, has been designed and built by Snyder Tool & Engineering Co., Detroit, Mich.

The machine has one loading and two work stations. When four parts are loaded, the automatic work cycle is started and parts are automatically shuttled into the drilling station. A bushing plate, equipped with locating pins and spring-loaded buttons, advances, locates and clamps the parts as the machining cycle starts.

After the drilling and counter-sinking cycle, parts are automatically shuttled to the tapping station and located and clamped in position. The tapping unit is a 16-spindle, individual lead screw-type tapping head incorporating Snyder safety tap drivers. Tapping speed is 40 sfm, with the taps staggered to reduce the power load. Each work cycle of 16 seconds, or at the claimed rate of 788 pieces per hour, completes sixteen 7/16-20 holes. **T-4-49**



Hydraulic Tracer

A hydraulic attachment for shaft and profile contouring that can be installed without drilling or fitting on LeBlond heavy duty lathes in the field has just been announced by the R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio. Known as the "Hydra-Trace", this device accommodates stock to the full swing capacity of the lathe, and does not interfere with cross slide travel or prevent the use of the taper attachment.

LeBlond officials state that the Hydra-Trace is available in six different sizes for use on LeBlond heavy duty engine, the RT series engine and tool room, plain and sliding bed gap, and rapid production lathes.

Operating on the template-actuated stylus principle, the Hydra-Trace brings automatic stepless contouring to the standard lathe. It will perform the complete range of operations, including straight facing and turning, tapers of any kind, shoulders, necking, concave and convex surfaces, and spherical surfaces. A stylus control metering device is built directly into the compound rest. Diameters are adjustable by means of the lathe cross feed screw, and feeds are selected directly through the regular feed box.

An idea of the capacity of the unit may be gained by examining the 16 in. size. With 3 in. top slide travel shaft diameters can be reduced from 4¼ in. to 6 in. by varying the angle setting of the tracer slide. On a standard 16 in. heavy duty engine lathe, shaft and profile facing jobs up to 20½ in. diameter can be accommodated. **T-4-50**

Universal Screw Starter

George P. Heller Company, 2019 Grand Avenue, Kansas City 8, Mo., offers the Universal Screw Starter for assembly lines, mechanics and service men. These starters work on slotted, Phillips, and all special screw heads, including counter-sunk screws.

Dual bits rotate in opposite directions upon handle pressure to hold screws by friction grip, and holding grip is increased with increased pressure on handle. Release mechanism in handle-butt permits free disengagement. Fully described in a bulletin, available on request. **T-4-51**

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For your convenience, a key number follows the announcement of each product reviewed in the *Tools of Today* section of THE TOOL ENGINEER. To obtain complete information on any of these products, circle the corresponding key numbers on this coupon, and mail the coupon to THE TOOL ENGINEER.

Tools of Today Department, THE TOOL ENGINEER
550 West Lafayette Blvd., Detroit 26, Michigan

Gentlemen:

Please send me further information on the following Tools of Today items which I have checked:

T-4-1 T-4-2 T-4-3 T-4-4 T-4-5 T-4-6 T-4-7 T-4-8 T-4-9
T-4-10 T-4-11 T-4-12 T-4-13 T-4-14 T-4-15 T-4-16 T-4-17 T-4-18
T-4-19 T-4-20 T-4-21 T-4-22 T-4-23 T-4-24 T-4-25 T-4-26 T-4-27
T-4-28 T-4-29 T-4-30 T-4-31 T-4-32 T-4-33 T-4-34 T-4-35 T-4-36
T-4-37 T-4-38 T-4-39 T-4-40 T-4-41 T-4-42 T-4-43 T-4-44 T-4-45
T-4-46 T-4-47 T-4-48 T-4-49 T-4-50 T-4-51

Name .....

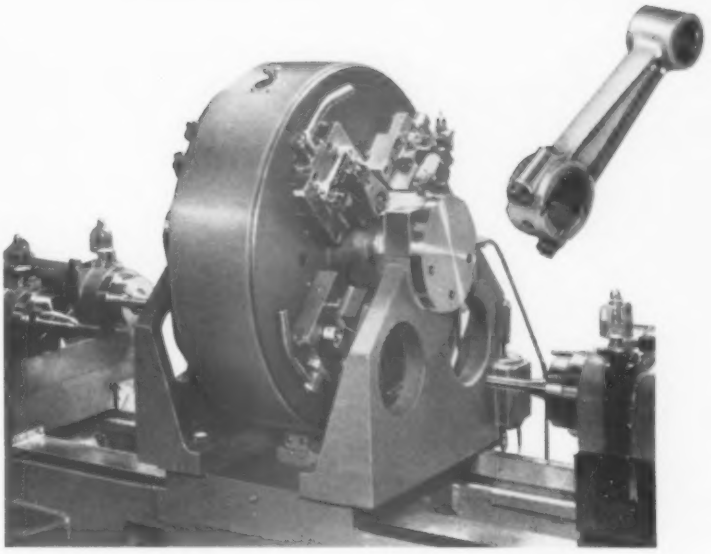
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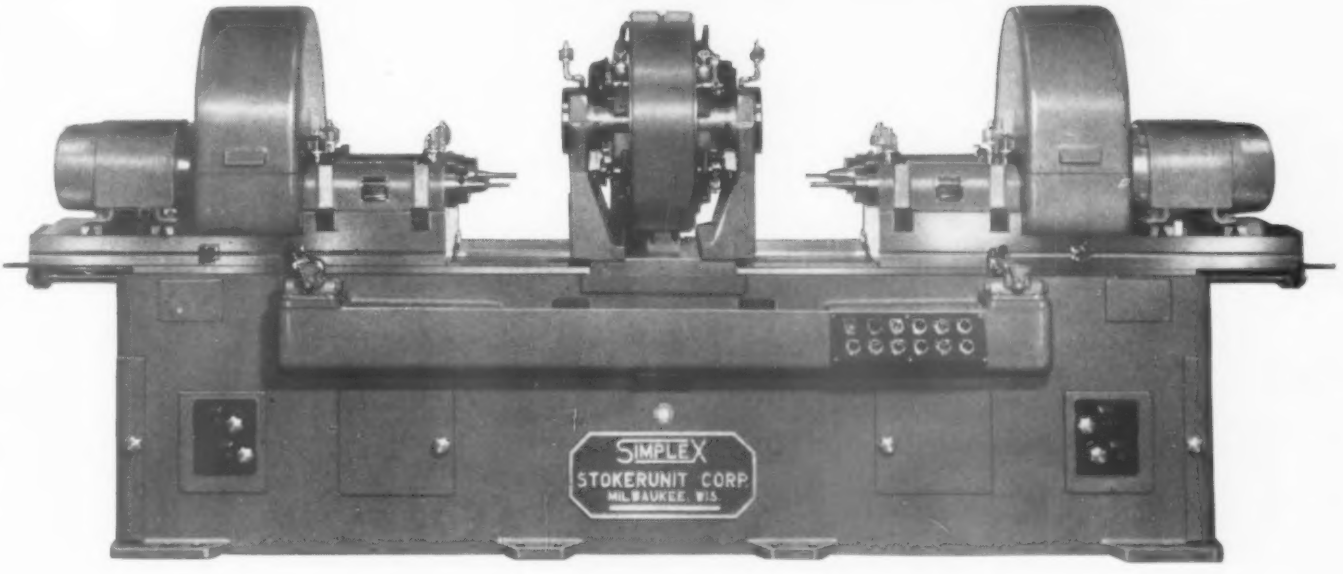
Firm .....

Street ..... City, State .....

SIMPLEX

Small high speed gas engines run at speeds unbelievable a few years ago yet with mechanical failures rare due to the increasingly high standard of workmanship on the running parts, but costs must be reduced to reach the volume market. SIMPLEX Precision Boring Machines with SIMPLEX engineered tooling are used for this purpose by many leading manufacturers.





This SIMPLEX 2U 2-way Precision Boring Machine with double-faced automatic indexing trunnion fixture is tooled for semi-finish and finish boring small die cast aluminum connecting rods with bronze inserts. Boring tolerances are plus .0003, minus .0000. Interchangeable fixtures are provided so that several different size rods can be run on one machine. This principle is applicable to many size rods where maximum production and accuracy at low unit cost are required.

Precision Boring Machines

STOKERUNIT CORPORATION

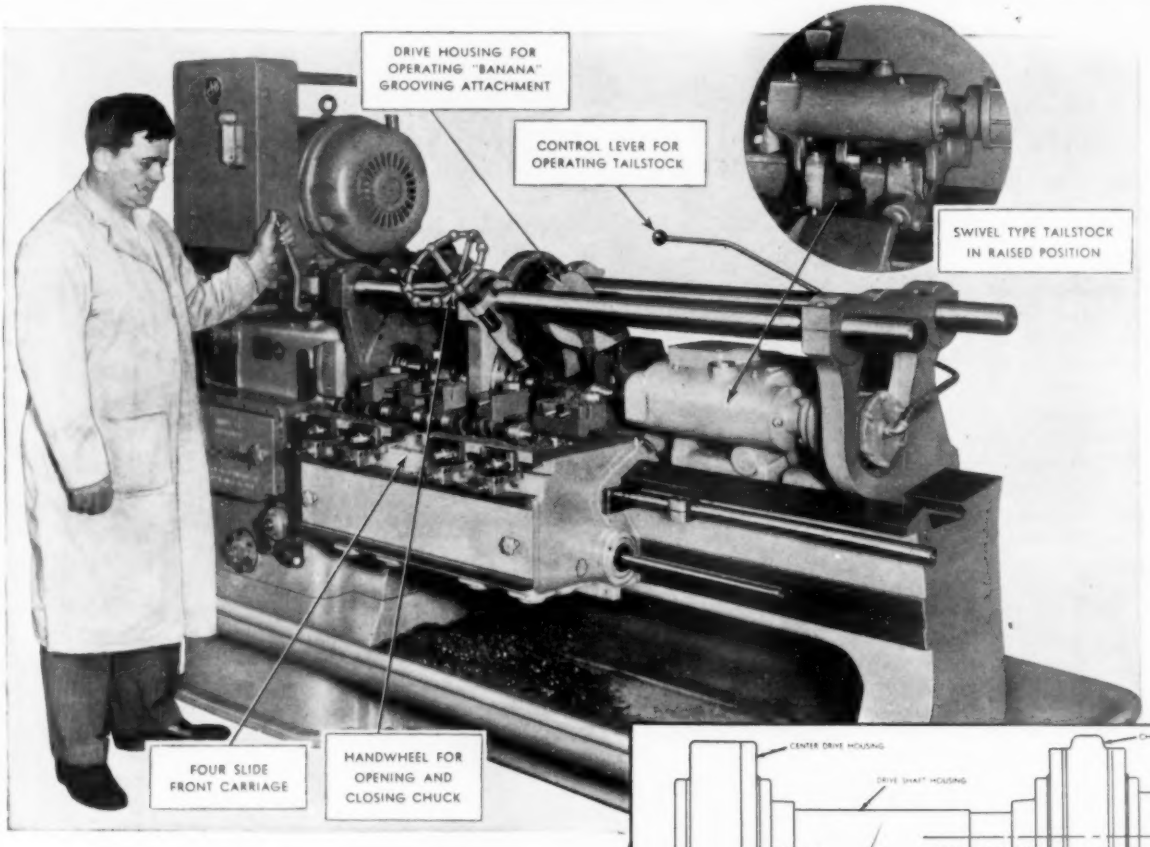
SIMPLEX Machine Tools Division

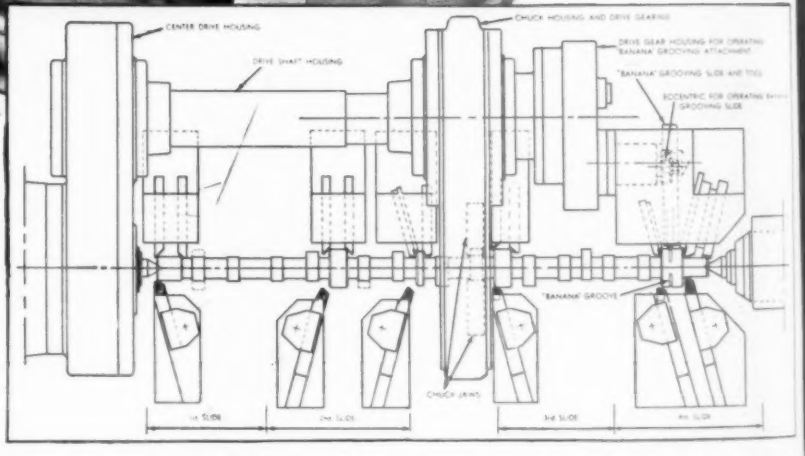
4528 West Mitchell Street, Milwaukee 14, Wisconsin

Precision Boring Machines, Planer Type Milling Machines and Special Machine Tools

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK





MODEL "LR" CENTER DRIVE AUTOMATIC Lo-swing LATHE TURNS CAM SHAFTS IN SINGLE OPERATION

Problem: Turn and chamfer all bearings, oil pump gears and cut interrupted oil or "banana" grooves in a single operation.

Solution: The Center Drive Model "LR" Automatic Lo-swing Lathe selected for this job was equipped with a special two-jaw scroll chuck, clamping and driving the shaft from the cam located adjacent to the number three bearing. The chuck jaws are opened and closed with a permanently mounted, gear type, hand wheel shaft. The air operated, swivel type tailstock is operated with two air cylinders, one of which swings the hinged upper section vertically, (see insert) to permit easy loading and unloading in a line parallel with the centers, thus eliminating all overhang of the tailstock center. The second air cylinder controls the movement of the spindle quill. Both movements are controlled by a four-way control valve.

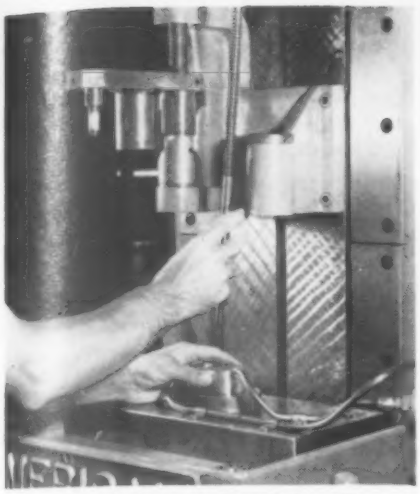
The "banana" grooving attachment is driven and TIMED from the main drive shaft and imparts a shuttle motion to the grooving tool slide, which is mounted, with other squaring tools, in a block on the rear slide. The driving head swivels on the chuck drive housing and follows the "feed in" and "feed out" movement of the rear slide. The "banana" grooves are always cut in definite relation to the chucked cam on the cam shaft.

The machine cycle is as follows: the operator places the cam shaft between centers, closes the chuck jaws and operates the spindle starting lever. The front carriage slides and tools advance in rapid traverse to the cutting position and then slow down for normal feed. The squaring, chamfering and grooving tools, mounted on two automatic back squaring attachments, are timed to cut immediately after the front turning tools have ceased cutting. Immediately the rear tools have ceased cutting, all tools and slides are returned to the starting position in rapid traverse. All movements are automatically controlled; the operator simply loads and unloads the parts and operates the starting lever.

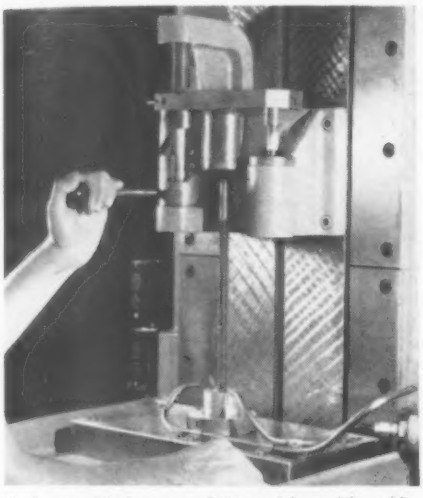
Production per hour at 85% efficiency . . . 80 cam shafts! Bring your turning problems to Seneca Falls.

SENECA FALLS MACHINE CO., SENECA FALLS, N.Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing



Part locates in work nest—broach shank is manually placed through part into pull head, then...



leaf assembly is swung into position with guide bushing over broach rear pilot. Cycle . . .



is started manually. At end of stroke, guide is swung out—part is unloaded—broach is then returned to up position. Production rate—100 per hour net.

American 3-WAY MACHINE

plus

American ENGINEERING

SCORES AGAIN!

Common practice says broach the hole first . . . then machine the O.D. But here was the exception—a case where it was necessary to broach an involute spline located from a previously machined O.D. By mounting a special yoke type guide assembly directly to the ram face of the American T-6-24, American engineers were able to accomplish this operation while maintaining exceptional broach alignment and minimum broach drift throughout the broaching stroke.

American 3-Way broaching machines are general purpose machines that can be used efficiently on many classes of work. They are adaptable to internal broaching (both push down and pull) and surface broaching. They may be equipped with more than one station, multiple broaches and electrical control. Highly productive, easily convertible as requirements change, American 3-Way broaching machines provide the plus values that make a good investment better.



Finish broaching an involute spline through the center of Pump Rotor performed on American T-6-24 3-Way type Vertical Hydraulic Broaching machine arranged for pull down operation.

Investigate — The Plus Value Features of American 3-Way Machines

Write for Circular 100. It describes in detail the design features that make the American 3-Way broaching machines a profitable investment. Fully illustrated and FREE. Address Department T.



American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

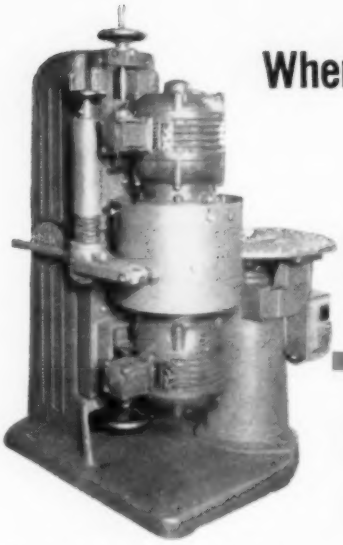
ANN ARBOR, MICHIGAN

American First—for the Best in Broaching Tools, Broaching Machines, Special Machinery

When It's a Matter of Grinding Springs and Small Parts...

Only BESLY

Offers This *Complete* Line of Production Grinders



No. 902 Besly Vertical Spindle Grinder for small coil springs, carbon brushes, ceramic parts, etc. Handles up to 4000 pieces per hour — ⅛" to 1" O.D. and from ¼" to 4" long.

14 BASIC MODELS *Proved in Use*

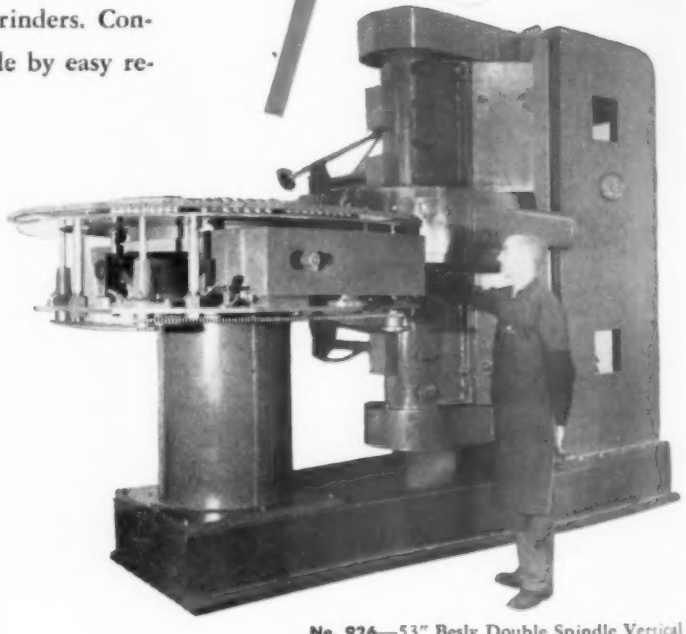
Whatever the job specifications may be, there's sure to be a Besly Grinder that will do the work faster on closer tolerances —*with greater economy*. Sizes range from those that handle the smallest parts to large capacity units for grinding railroad car springs and similar large pieces. Fourteen different types are available to select from. Besly engineering adapts basic models to specific requirements of the user. Versatility in doing many grinding jobs well is characteristic of Besly Grinders. Conversion from one job to another is quickly made by easy replacement of the work holder.

Simplify production! Cut job costs! Talk over your requirements with a Besly engineer. Besly Grinders earn their way with savings of time, labor and material.



TITAN WHEELS

Write today for this helpful booklet which offers useful facts on abrasive wheels . . . It's free. Contains much valuable data on grinding wheels and abrasives. Learn how Besly-Titan Steelbacs cut "down time" and boost output.



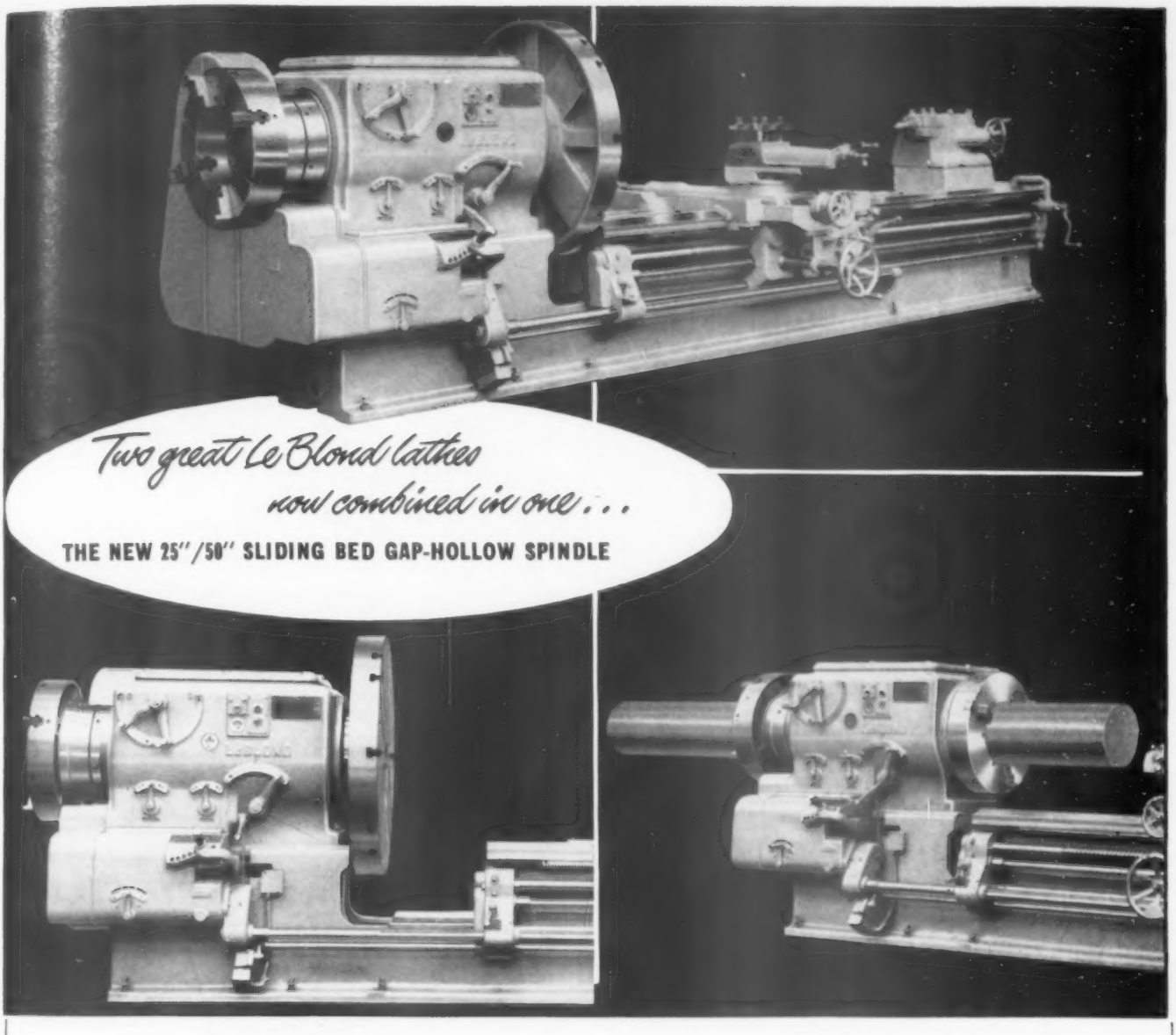
No. 926—53" Besly Double Spindle Vertical Grinder with power driven rotary fixture and multiple station feed wheel. Tooled for coil springs ¾" to 6" long—800 to 1500 per hour.

Maybe GRINDING is the Better Way . . . Better Check with

BESLY GRINDERS AND ACCESSORIES
BESLY TAPS • BESLY TITAN ABRASIVE WHEELS

BESLY

CHARLES H. BESLY & COMPANY • 118-124 North Clinton Street, Chicago 6, Illinois
***Factory:* Beloit, Wisconsin**



Two great LeBlond lathes now combined in one . . .

THE NEW 25"/50" SLIDING BED GAP-HOLLOW SPINDLE

with adjustable gap . . .

. . . 12½" hole thru spindle

The sliding bed gap-hollow spindle lathe, developed at the request of the metal-working industry, has just been completed. Another LeBlond first, it's the last word in versatile heavy duty metal turning with heretofore undreamed of flexibility and enormous capacity. It'll produce the work of a battery of lathes with just one investment . . . in the floor space of just one machine. This new LeBlond producer will be welcomed wherever a volume of work of various shapes and sizes must be turned quickly, easily, and at low cost. A glance at the specifications will convince you it's the lathe for you. Send today for complete information.

★ SPECIFICATIONS

Swing over bed and carriage wings	33½"
Swing over gap	60½"
Distance between centers—base length bed—closed	8' 0"
Distance between centers—base length bed—extended	13' 0"
Spindle hole, size	12½"
Spindle speeds, range, rpm	5 to 213
Motor recommended	25/12½-hp 1200/600 rpm

Built with totally enclosed, automatically lubricated quick change box. Hardened and ground steel bed ways furnished at no additional charge.

THE R. K. LEBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES
NEW YORK 6, N. Y., Singer Bldg., 149 Broadway, COurtland 7-6621
CHICAGO 6, ILL., 20 N. Wacker Drive, STate 5561
PHILADELPHIA 40, PA., Beury Bldg., 3701 N. Broad, SAgamore 2-5900
DETROIT 7, MICHIGAN, New Center Bldg., TRinity 3-5561

LEBLOND

GEAR PRODUCTION HIGHLIGHTS

No. 102

Cutting-Shaving-Checking-Lapping

MICHIGAN TOOL COMPANY
7171 E. McNICHOLS RD. • DETROIT 12, MICH.

Form-Tools Cut Machine Time On Pump Gears 90%, Improve Precision

Gar Wood Industries, Inc., Wayne, Michigan, is currently producing all five of its major hydraulic pump gear types on a single Michigan Shear-Speed, followed by shaving on a Michigan rotary gear finisher. This setup has the following advantages:

1. **Sharply reduces cutting time (only 93 seconds for gear "E" against 18 minutes for hobbing).**
2. **Tooth spacing, so important and relatively difficult to maintain in pump gears, is automatically maintained by the multiple form tools of the Shear-Speed, even on the coarsest pitch gears having a minimum of overlap.**
3. **Distortion and difficulty in holding the work is eliminated since cutting pressures are completely balanced by cutting all teeth simultaneously, with radial feed.**
4. **Accuracy of tooth form is easily maintained since this depends primarily on the accuracy to which the form tools were ground initially.**
5. **Output per grind of tools is approximately doubled, reducing the number of tool changes during a given production run. Design of tools permits between 40 and 50 grinds, removing .015 each time.**

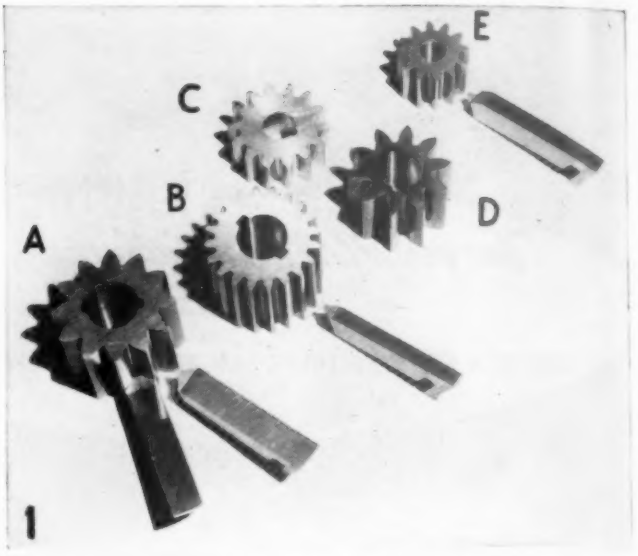
Fig. 1 shows the 5 types of pump gears (for specifications, see table below). Gear "A" is produced in two cuts, the roughing and finishing tools shown being interchangeable in the same cutter head. Gears "D" and "C" are also cut in two steps. However, two "C" gears are cut at one time with the blanks stacked one above the other. Metal removal on "C" and "D" is almost one-half of total blank weight.

Fig. 4 shows the cutter head, finished gear and blank for gear "E." The Shear-Speed is shown in Fig. 2, with one of the three gear shavers in Fig. 3.

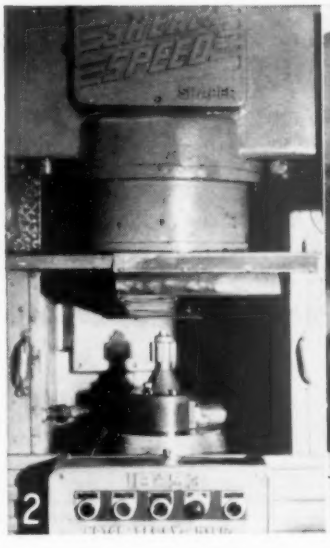
Pump outputs range from 13½ to 52 gpm at 800 psi and 1000 rpm for these gears. Finished gears are so accurate that the 13½ gpm pump will actually deliver up to 17 gpm at 1000 psi and 1000 rpm.

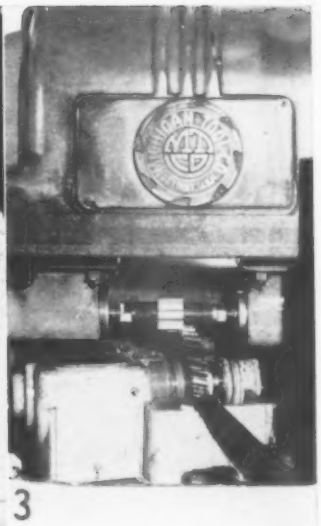
Gear (See Fig. 1)	No. of Teeth	Outside Dia.	Face Width	Diametral Pitch	Pressure Angle	Pump Use	No. of Operations
A	12	3.645	2¾	3.8052	35°	Road Mach.	2
B	20	3.487	2¾	6.342	20°	Road Mach.	1
C	14	3.192	1¼	5.000	22½°	Hoist	2*
D	10	3.195	2¼	3.8052	27½°	Loadpacker	2
E	12	2.332	1⅝	6.000	22½°	Hoist	1

*—Two gears cut at one time, however.



1


2


3


4

For Shear-Speed machine details, write Michigan Tool Company for Bulletin SS-48-2.

A glance at this 4-page picture presentation may give you an idea or two as to how to PRODUCE BETTER FINISHES and at the same time LOWER YOUR COSTS



* P-32T: Pope Direct Motorized Cartridge Type Spindles, for 6" x 18" surface grinders, produce superior finishes, rough off surplus metal fast, run cool and deliver full 1 HP at the wheel.

† P-2500: Pope Heavy Duty Motorized Spindles are for use on surface grinders, planers, boring mills and other machine tools. They come in sizes from ¾ HP to 20 HP and from 900 to 3600 RPM. They are available with flange or tapered nose for quick mounting of wheels or tools.

No. 59

MAIL THIS TODAY

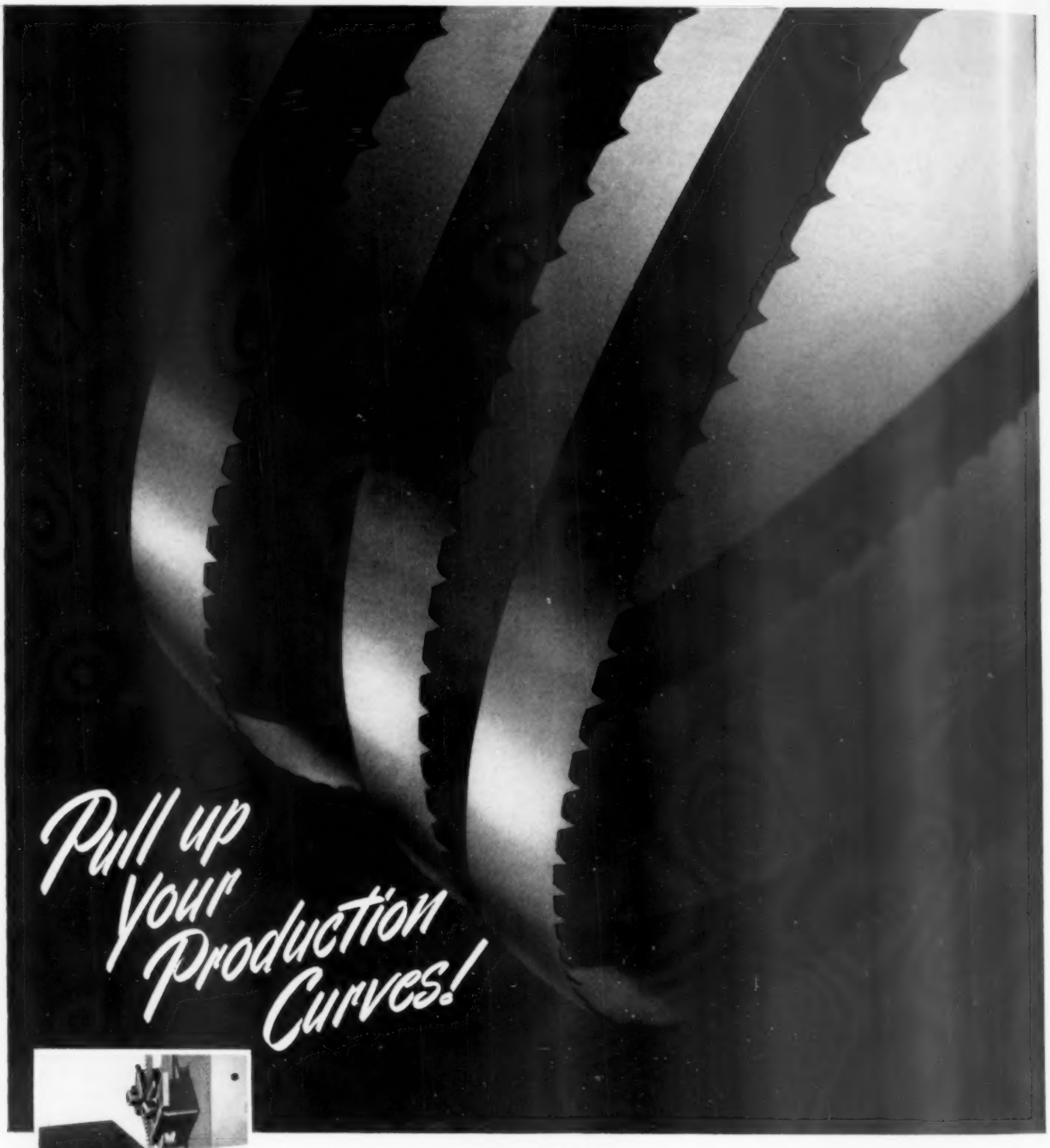
POPE MACHINERY CORPORATION
261 River St., Haverhill, Massachusetts

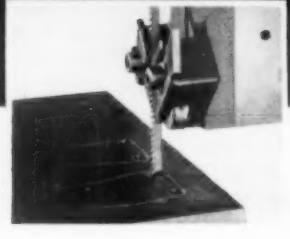
Gentlemen: Please mail me a copy of your Bulletin S-2, with the understanding that no personal follow-up will be made unless requested.

NAME ..... POSITION .....

COMPANY .....

ADDRESS .....





Use SIMONDS Metal-Cutting Band Saws

These tough blades start life with a steel of special analysis. The Skip-Tooth Saw shown gives outstanding performance in cutting non-ferrous metals and composition materials at high speeds and feeds. But whether your requirements are for skip-tooth or regular-tooth saws on horizontal or vertical machines, you are assured of evenly milled, perfectly shaped teeth, with heat-treatment controlled for maximum efficiency. Have your Industrial Supply Distributor recommend the right Simonds Band Saw for YOUR job. Call him today!



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BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green Street, Chicago 7, Ill.; 416 W. Eighth Street, Los Angeles 14, Calif.; 228 First Street, San Francisco 5, Calif.; 311 S. W. First Avenue, Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Washington. *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.

23... CUBIC INCHES TOUGH STEEL REMOVED IN 58 SECONDS



Using

BARBER-COLMAN

TANTUNG-TIPPED

SLAB MILLING CUTTERS

Husky cuts in tough steel call for extra stamina in cutting tools — ability to do the job at a good rate of production, without sacrificing tool life.

For example, in this brake band milling operation, Barber-Colman Tantung-Tipped Cutters remove 23 cubic inches of SAE 5140 steel *in 58 seconds*, and do it producing 250 pieces per sharpening. This is a total of 2937 cubic inches of metal removal between sharpenings. High speed steel cutters do not stand up under this fast heavy cut.

If you have a metal removal problem, whether it's to get greater production or more economical tool life, ask your Barber-Colman representative for recommendations on *Job-Engineered Cutting Tools.*

JOB FACTS

Operation — Remove 3/8" stock, 1 3/4" wide on brake band 7" dia.

Cutters — B-C Tantung-Tipped Slab Mills, 4 1/2" x 4" x 1 1/2"

Material — SAE 5140 Steel

Cutter Speed — 175 RPM

Tool Life — 250 pieces per sharp. 15-20 sharpenings

MORE DATA FREE!

Get this complete file of milling cutter performance records. Ask for File No. 4416.



Barber-Colman Company

GENERAL OFFICES AND PLANT, 4416 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.



BARBER COLMAN

Announcement by *Snyder*

THE goodwill, patents, inventory and certain assets of the Arthur Colton Company have been purchased by Snyder Tool & Engineering Company of Detroit which will operate the Colton Company as a subsidiary under the Colton name.

Operation will be transferred to the large, new Snyder plant where there is every modern facility for building fine machines for many fields of manufacturing and packaging.

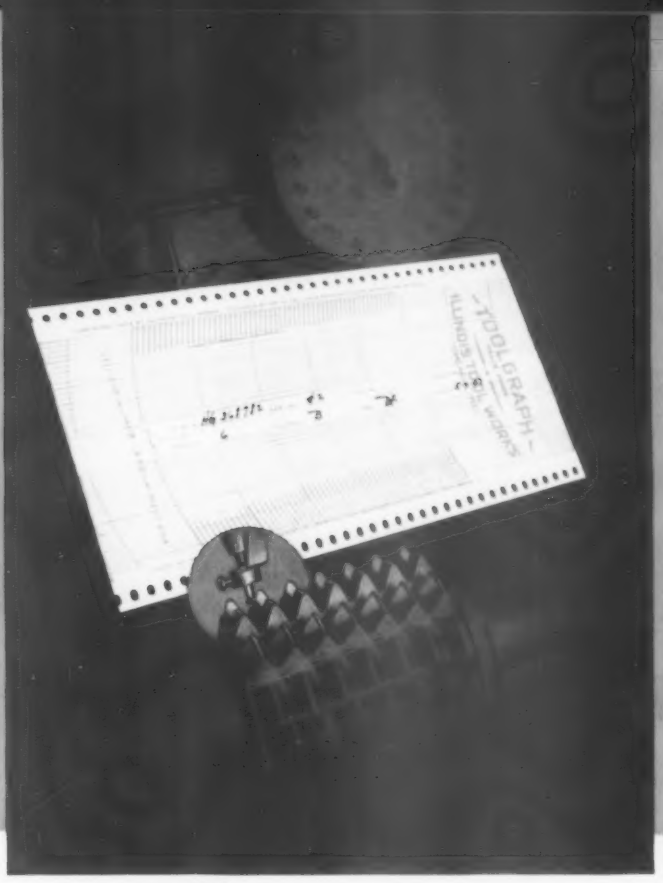
Administration will be in the hands of an executive combination merging the specialized experience of the engineering, sales and manufacturing departments of the 65-year-old Colton Company with that of the 25-year-old Snyder Company in order to provide a service of outstanding worth to Colton clients throughout the world.

SNYDER TOOL AND ENGINEERING COMPANY

DETROIT, MICHIGAN

developed by
ILLINOIS TOOL,
the TOOLGRAPH*
CHART





PROVIDES *Visual Proof* OF HOB ACCURACY!

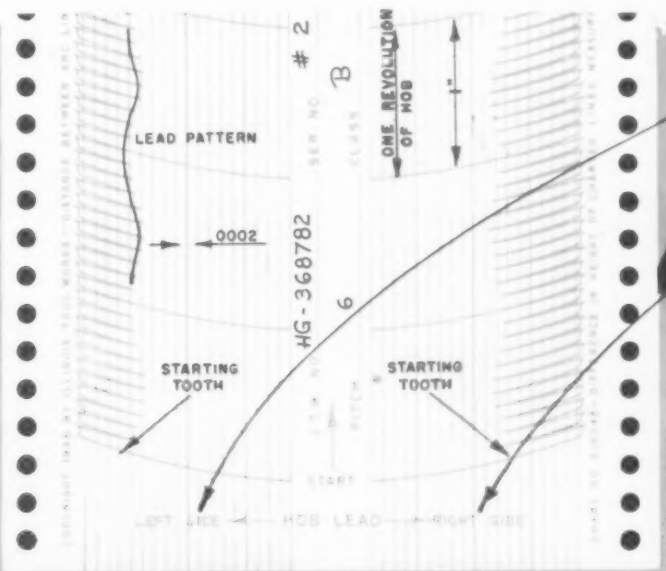
For more than 36 years, Illinois Tool Works has been universally recognized as a leading producer of hobs of extreme accuracy and high quality. And now, as an extra service to users, Illinois Tool offers visual proof of hob accuracy which aids inspection and eliminates duplicate checking. Packed with every hob is a Toolgraph Chart . . . an *electrically* recorded chart of the hob lead which reveals the pattern, as well as the magnitude, of any deviation from nominal dimensions. This chart is far more accurate and is easier to evaluate than the commonly furnished indicator readings.

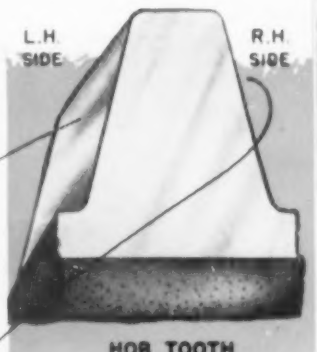
The Toolgraph Chart is described in detail in Booklet A-29. Write for a free copy, today, so that you may completely appreciate the significance of this extra service relative to your gear problems . . . another reason for making Illinois Tool Works . . . your "Headquarters for Metal Cutting Tools."

ILLINOIS
TOOL WORKS

2501 North Keeler Avenue • Chicago 39, Illinois
In Canada: Canada Illinois Tools Ltd., Toronto, Ontario

*TRADE MARK



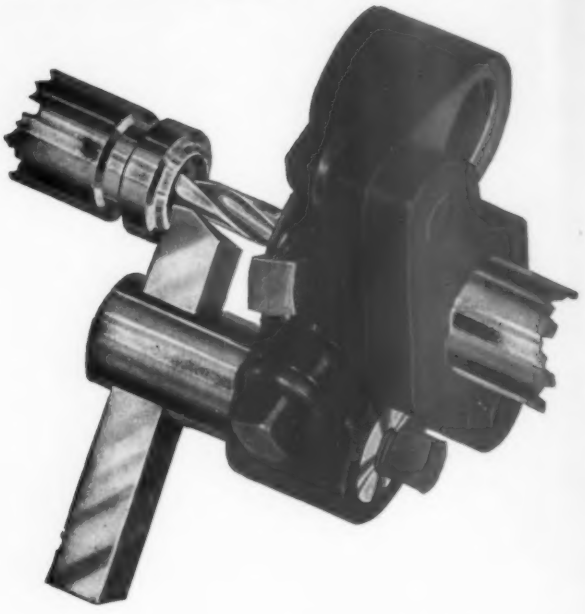


HOB TOOTH
TOP COMING

Illustrated at left is a section of a Toolgraph Chart which shows deviation within tolerance, the exact location of each tooth in relation to all other teeth and in relation to the desired theoretical lead helix.

ON YOUR TURRET LATHES AND SCREW MACHINES

DOUBLE [MAKE TWICE AS MANY] PRODUCTION with R and L TOOLS . . .



Here's proof of R and L versatility: Turning and forming special shape on end of part while drilling or reaming.

In enough cases to make the proverbial Scotchman jump for joy, R and L Tools actually enable shops to double the number of pieces produced per hour. We know that this statement will be open to question. We'd like you to question it and ask for proof because we know that once you saw the versatility of R and L Tools and their many, many possible applications, you'll want to use them whenever possible on all your machines. As a starter, we suggest you write us now for the idea-packed R and L Booklet which shows many R and L set-ups which are doubling production capacity in other shops throughout the country.

Production Records Always Tell the Wisdom of Tooling With R and L

R and L Tools, Inc.

1825 BRISTOL STREET NICETOWN, PHILADELPHIA 40, PA.

New! Carbide-Surface R and L Back Rest Holders



Simple design allows for convenient interchanging of the R and L carbide surfaced backrest or roller backrest. Built in three sizes—5/8", 3/4" and 1" diameter shank—these dependable holders may be adjusted for diameters, within their respective ranges, to reduce chatter and insure accurate turning. Tool life is immeasurably extended as a result of the carbide surfacing.

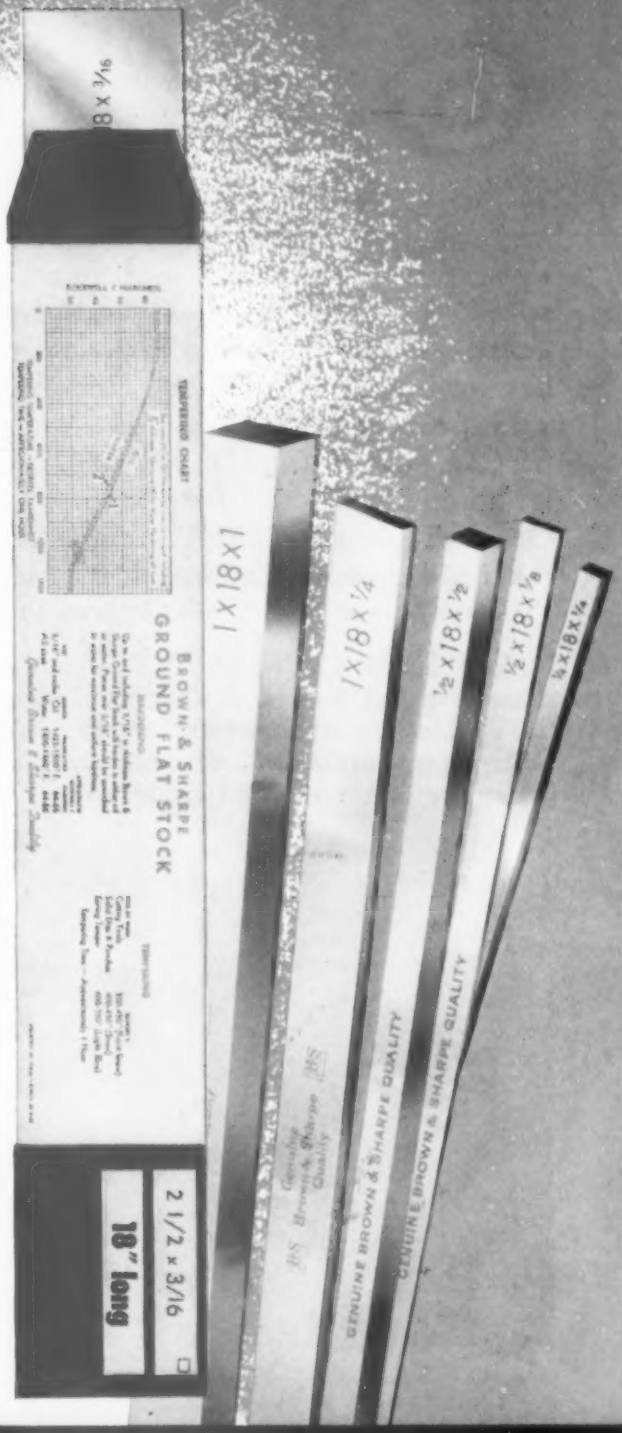


An Important Cost Saver!

for templates, cutting tools, gages, test tools, machine parts and many other items . . .

Brown & Sharpe GROUND FLAT STOCK





SAVE TIME . . . SAVE MONEY

Here's one way to beat high costs. By making small parts from stock accurately pre-ground to size, you can avoid expensive, difficult grinding operations. What's more, you save man-hours and machines for more profitable work.

Brown & Sharpe Ground Flat Stock is accurate to within .001" in thickness. It is selected first-quality tool steel, annealed uniformly by a special process to make machining easy. Up to and including 3/16" in thickness, hardens in either oil or water to 64-66 Rockwell C. Pieces over 3/16" should be quenched in water for full hardness.

Brown & Sharpe Ground Flat Stock in 18" lengths is available in sizes that cover most requirements. Get an adequate supply from your Brown & Sharpe distributor. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

Regular stock sizes include 13 different thicknesses from 1/64" to 1/2" . . . widths up to 6" . . . also square sizes. Individually packaged in clean, protective envelopes marked with size and heat treating instructions. Easy to store. Easy to handle.

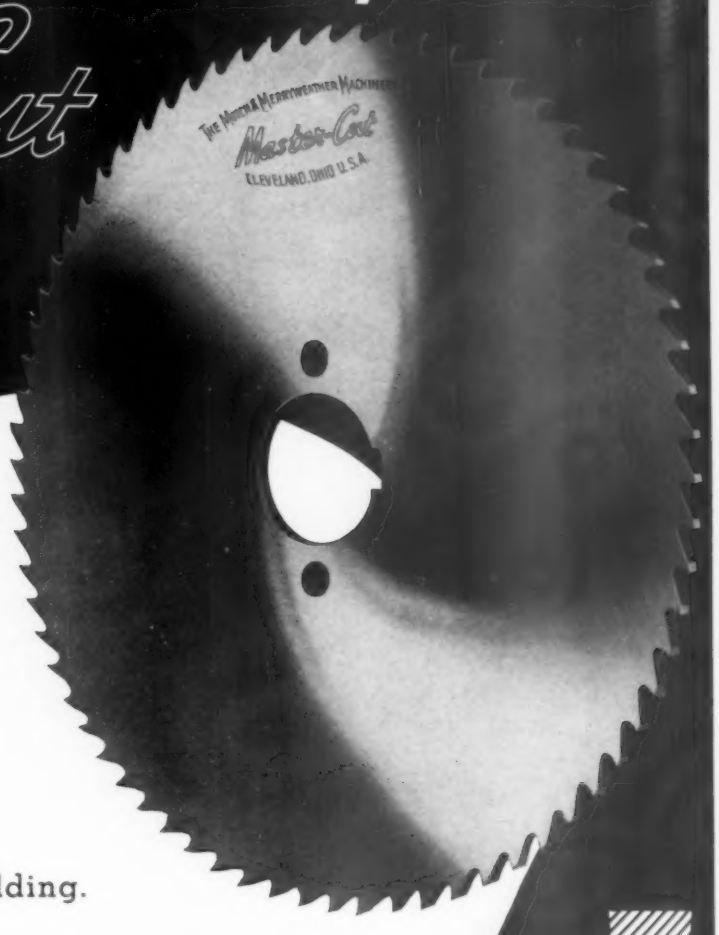
We urge buying through the Distributor

BROWN & SHARPE B·S

NOW... the Motch & Merryweather

Master-Cut

A Better Blade for No More!



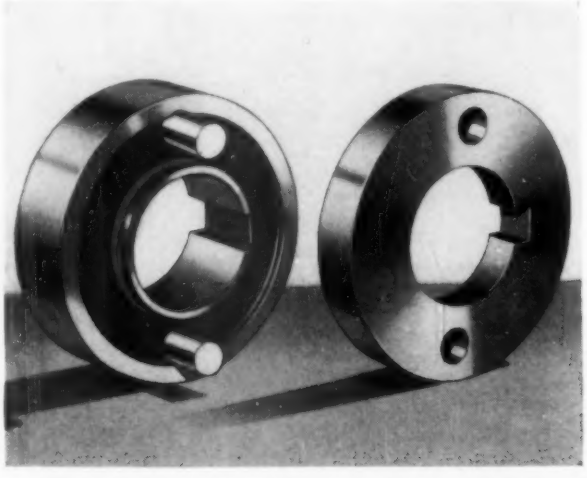
The *new* Master-Cut Blade, made of high speed steel, offers you definite advantages which pay out handsomely. The proper rake angle enables the teeth to cut ferrous or non-ferrous materials faster. Uniform side clearance avoids binding and friction. M. & M. Dual Drive Adaptors lengthen life and eliminate breakage. Our distinctive *flat hub,* thinner than the cutting edge, makes for rigid holding.

* *

M. & M. Master-Cut slitting blades are available in diameters of 3" to 8" and standard thicknesses of 1/32" to 3/16". Also, we manufacture the well known Triple-Chip segmental and solid circular saw blades. Complete literature upon request.

• *Available from stock in Dual Drive or conventional key drive type.*





Motch & Merryweather Dual Drive Adaptors allow the same blade to be used on a range of arbor sizes. The adaptor is keyed to the blade to provide ample driving power.

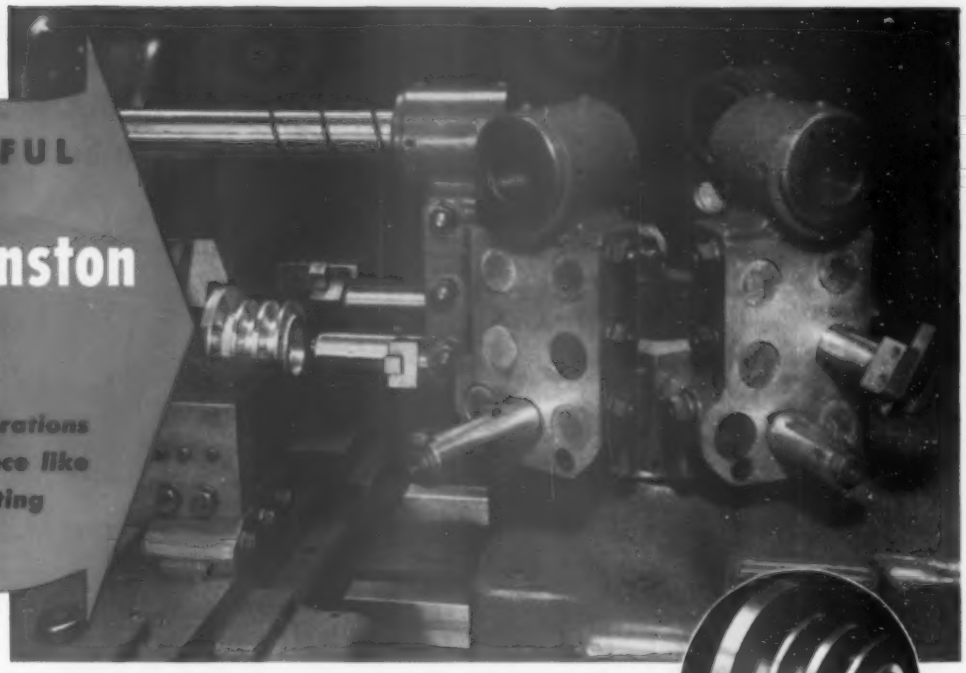
Ask for Bulletin "T-4."

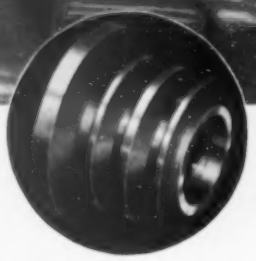
THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING • CLEVELAND 13, OHIO

IT TAKES SKILFUL TOOLING

Potter & Johnston Tooling

To do 12 machining operations in 1.60 minutes on a piece like this aluminum pulley casting





It takes years of experience and a special kind of engineering ingenuity to dope out the right combination of operations, turret face by turret face that results in better work and more of it per day at lowest cost per unit.

That is the particular specialty of P&J tooling engineers — proved time and again by outstanding parts production performance in the field.

That is why it is to your very great advantage to take your production problems to P&J — see what we have to suggest when you send us your parts or prints.

Tooling recommendations, estimates and time studies cost you nothing and may show the way to big savings. How about it?

HERE IS THE JOB,
ONE TURRET FACE AFTER ANOTHER

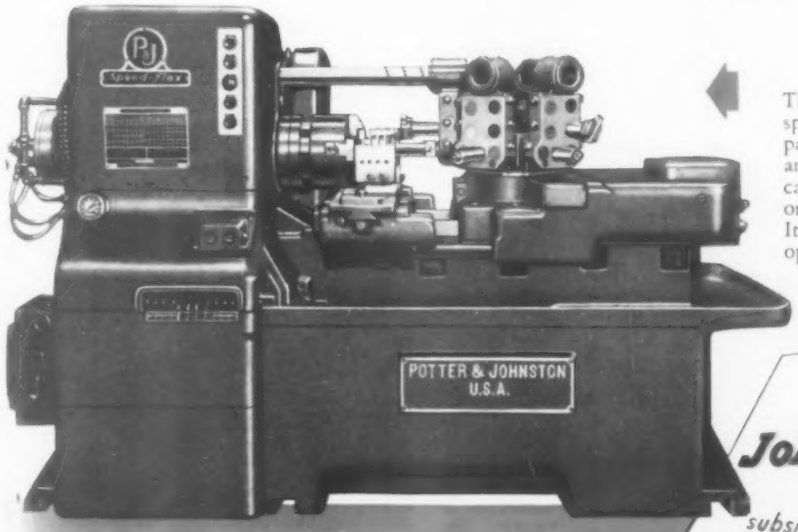
1st T.F.: Bore hole halfway; rough turn O.D.; face end; rough and finish form "V" grooves; face flange.

2nd T.F.: Bore balance of hole; bore C'bore at front end; finish turn O.D.; face end.

3rd T.F.: Finish bore hole and C'bore.

4th T.F.: Machine grooves in bore (slide tool)

5th T.F.: Size bore hole 2.047" dia.



HERE IS THE MACHINE

THE P&J 3U SPEED-FLEX

This Potter & Johnston Automatic Turret Lathe is specially designed for high speed production of small parts. It is equipped with four automatic speed changes and three automatic feed changes, electro-pneumatically controlled. It effects split second change of speeds or feeds or shift from the feed to the rapid traverse. It provides independent or simultaneous cross-slide operation with selected turret faces or with all six.

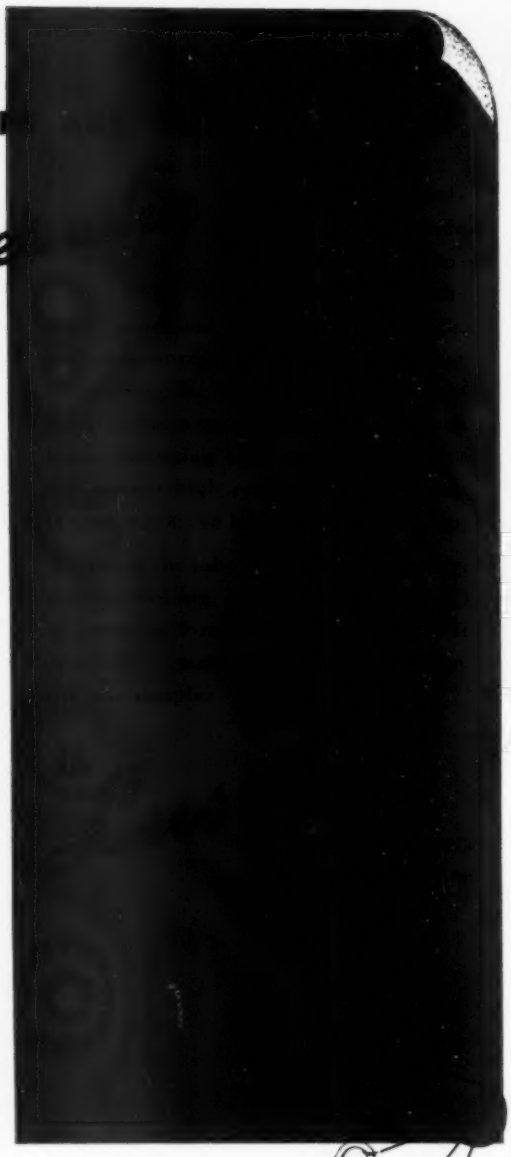
3U SPEED-FLEX

Potter & Johnston Company
Pawtucket, R. I.
subsidiary of Pratt & Whitney
Division Niles-Bement-Pond Company

P&J

THE CHI

here



(2) CASE HISTORY

MACHINE	OPERATION	MATERIAL
Snyder Horizontal Multiple Spindle Drilling & Tapping Machine	Drill 11/16" hole 7/8" deep. Tap 3/4"-No. 20	Steel Casting

PRODUCTION

OTHER COOLANTS	LUSOL
1984 pieces in 50 hrs. using 41 drills, 25 taps	2060 pieces in 50 hrs. using 12 drills, 8 taps

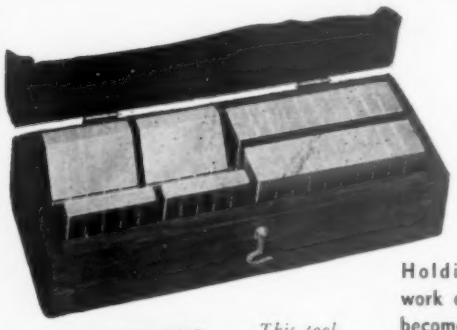
Saved with Lusol
29 DRILLS
17 TAPS

F. E. ANDERSON OIL COMPANY
PORTLAND, CONNECTICUT
RUST PREVENTIVES • SPECIAL INDUSTRIAL FLUIDS • CLEANERS

Distributors in: Syracuse, Cleveland, Toledo, Detroit, Chicago, Milwaukee, Louisville, Philadelphia, Dallas, Houston, Los Angeles, Denver, Tulsa

SCHERR *aids to precision*

MAGNE-BLOX Save Dollars and Trouble on Surface Grinder Set-ups



In this set, two parallels 1" x 1¾" x 3¾" and two V-blocks 1¾" x 2⅛" x 1⅞". These blocks alone will hold the usual run of odd shaped work occurring in the average shop. Price of set, with case, $17.50.



This tool-maker's angle iron has many valuable uses. Price $24.00

Holding irregular shaped work on a magnetic chuck, becomes simple with Magne-blox. There is almost no limit to the set-ups they permit, with special fixtures. Many users save their magnetic chucks in extremely accurate work by taking a light cut off the Magne-blox, then placing the work on them for a truly parallel grinding job.

WRITE FOR FULL DETAILS ON THESE TOOLS

GEO. SCHERR CO., Inc. 199-A LAFAYETTE STREET NEW YORK 12, N. Y.

LESS OPERATIONS AND BETTER WORK

WITH A GATCO *ROTARY PILOT BUSHING*

DUST PROOF



AS A WATCH

ROUND-CHATTERLESS-SMOOTH

GATCO Rotary jig and pilot bushing is built for core drilling, diamond boring, turret tool piloting, piloting hollow mills, line reaming, carbide boring, spot facing, etc.

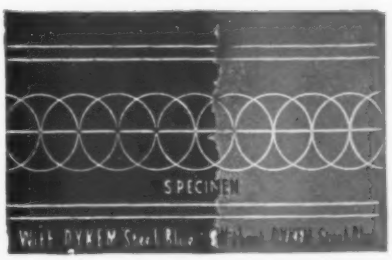
Originators of Rotary Jig & Pilot Bushings

GATCO ROTARY BUSHING CO.
1300 Mt. Elliott Avenue • Detroit 7, Michigan

DYKEM STEEL BLUE

STOPS LOSSES

making dies & templates



Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY, 2303D North 11th St., St. Louis 6, Mo.
In Canada: 2466 Dundas St. West, Toronto, Ont.



A portion of the stock room in a Danly assembly branch where component parts of Danly die sets are stocked awaiting assembly to your specifications. It is this specialized service that is so much a part of Danly's facilities that help you save time and avoid production delays.

you save time 3 ways using...

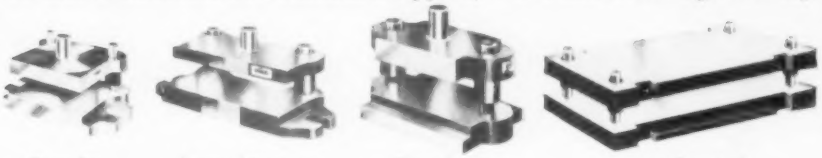
DANLY *Precision* Die Sets

1 Precision Insures Long Die Life . . . Cuts Downtime

The more highly controlled accuracy of Danly Precision Die Sets results in longer production runs between die regrinds. Stamping quality and uniformity are also improved.

Guide posts and bushings of each Danly Precision Die Set are ground and lapped with final lapping of bushings after assembly. Assembled accuracy is inherent. This means accurate die closure in the press setup, giving you longer die life and lower production costs.

2 Wider Selection of Standard Types, Plus Interchangeability



Regular Back-Post Set | Long Narrow Back-Post Set | Standard Center-Post Set | Large Special 4-Post Set

Consult the Danly catalog for a wider variety of standard types of die sets. For example, in any one of the many types, there are several thousand interchangeable combinations, each to suit specific needs. Interchangeable replacements, including any single component of the die set, offers substantial savings in time, giving you flexibility and worthwhile economy.

3 Danly Nationwide Assembly Service Speeds Deliveries

Assembly plants are located in major tool and die centers. Here, variety and prompt service are available to your door . . . a real saving when time is important . . . use the Danly branch in your area to save time and reduce costly delays.

Call on the Danly Branch nearest you

Assembly plants listed below (marked with stars) stock interchangeable parts for quick assembly and delivery of any standard die set to suit your specifications.

- **Chicago 50,** 2100 S. 52nd Ave.
- **Cleveland 14,** 1550 E. 33rd St.
- **Dayton 2,** 990 E. Monument Ave.
- **Detroit 16,** 1549 Temple Ave.
- **Grand Rapids,** 113 Michigan St., N.W.
- **Long Island City 1,** 47-28 37th St.
- **Los Angeles 54,** Ducommun Metals & Supply Co., 4890 S. Alameda
- **Milwaukee 2,** 111 E. Wisconsin Ave.
- **Philadelphia 44,** 18 W. Chelten Ave.
- **Rochester 4,** 16 Commercial St.

DANLY

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS



25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

PRECISION DIE SETS...STANDARD AND SPECIAL • MECHANICAL PRESSES AND PRESS EQUIPMENT

IT'S A Mac-it®

PRONOUNCED "MACK-IT"

Mac-it Hollow Pipe Plugs — for accuracy, safety, uniformity and strength.



Welcome to BOOTH 159
Triple Mill Supply Convention
Cleveland
APRIL 25-6

BETTER, FASTER SERVICE WITH THIS *COMPLETE* MAC-IT LINE!

Because many standard types of Mac-its are stocked throughout the country for quick delivery, and because specials can be engineered to your own specifications, you'll find it pays to investigate Mac-its *first.*

Mac-it's 35 years' experience in the manufacture of heat-treated, alloy steel screws is your assurance of precision, uniformity and strength. Sold through leading industrial distributors from coast to coast and in Canada. Write for new catalog today!

Other Mac-it products include:

- Hollow Lock Screws
- Socket Head Cap Screws
- Hollow Set Screws
- Stripper Bolts
- Socket Screw Keys
- Square Head Set Screws
- Hexagon Head Cap Screws
- . . . and many others

Marketed Nationally Since 1913 by

STRONG, CARLISLE & HAMMOND COMPANY
Cleveland 13, Ohio

Manufactured by MAC-IT PARTS COMPANY, Lancaster, Pa.

A REAL TIME-SAVER..



UNBRAKO
Reg. U. S. Pat. Off.

KNURLED SOCKET HEAD CAP SCREW

Yes, these "UNBRAKO" Knurled Socket Head Cap Screws are real time savers because, the knurled head provides a "sure grip" even for oily, greasy fingers; therefore, the "UNBRAKO" can be screwed-in faster and farther before it becomes necessary to use a wrench. And, carefully controlled processing during manufacture assures Strength and Accuracy.



Kits, Pats. Pend.

Knurling of Socket Screws originated with "Unbrako" in 1934.

"Hallowell" Key Kit

You can't tighten or loosen socket screws without a hex socket wrench, so why not get out No. 25 and No. 50 "HALLOWELL" Hollow Handle Key Kit which contains almost all hex bits.

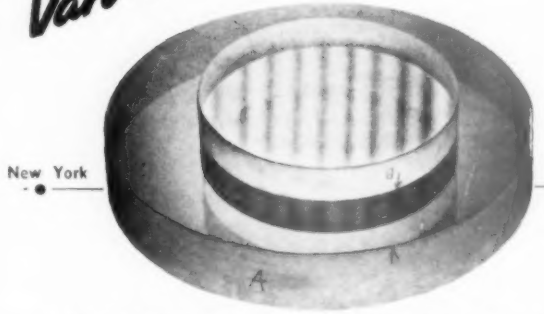
Write for the name and address of your nearest "UNBRAKO" Industrial Distributor and your copy of the "UNBRAKO" Catalog.

OVER 46 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNSYLVANIA, BOX 786
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Van Keuren **OPTICAL FLATS**
ARE THE PROOF OF PRECISION



If the 10" diameter Van Keuren Master Flat shown above were extended from New York to Boston, the surface would deviate from a true plane less than 1".
Insist on having Van Keuren Fused Quartz Optical Flats. They are beautifully finished and are of superlative accuracy on both sides. They are the best buy.

IF YOU HAVE A PROBLEM of testing flat surfaces, send us a sample part for examination and report.

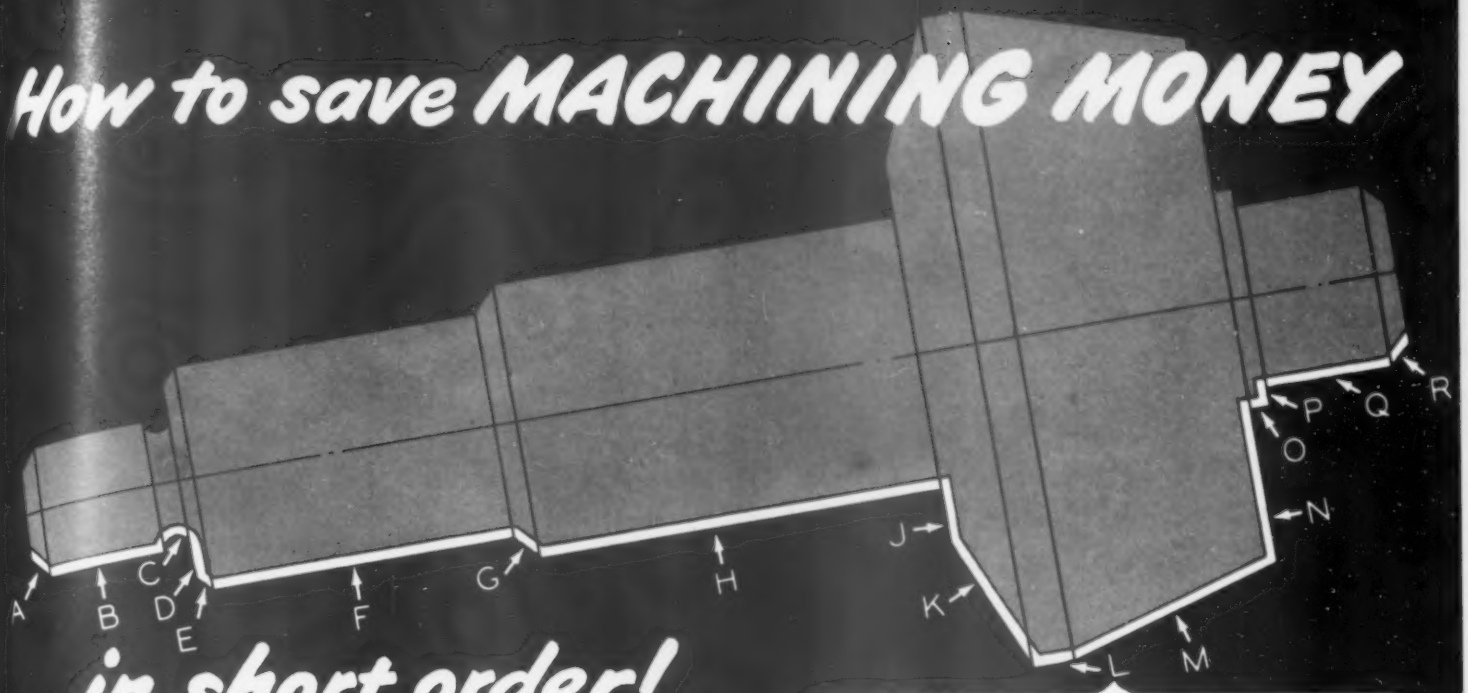
This 208-page volume represents 2 years of research sponsored by the Van Keuren Co. It presents for the first time in history a simple and exact method of measuring screws and worms with wires. It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods. Copies free upon request.



THE Van Keuren CO., 174 Waltham St., Watertown, Mass.
30th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Measuring Wires • Carboloy Plug Gages

How to save MACHINING MONEY



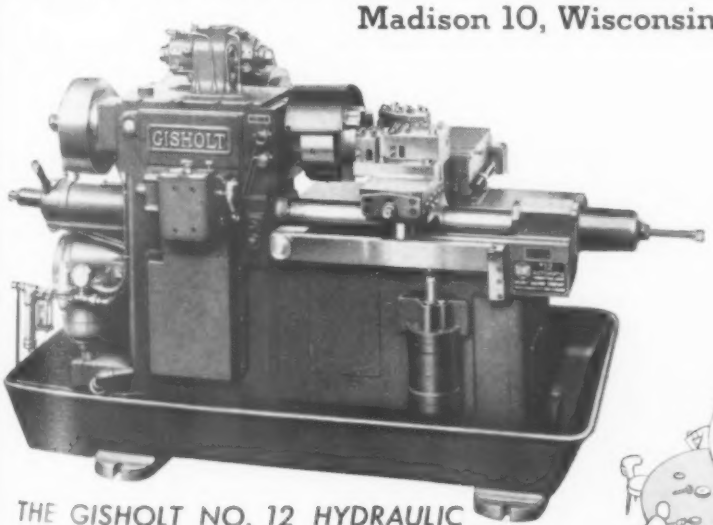
in short order!

with 4 GISHOLT HYDRAULIC AUTOMATIC LATHES

They're drive pinions—turned out in record-smashing time. This production set-up does the entire job, machining 17 surfaces in rapid, pass-along sequence at the rate of 55 pieces an hour. Each machine handles one operation, as shown at right. Two men operate all 4 machines—handle production on 8 similar parts. See what this does to costs?

It's one of many ways alert production men are capitalizing on the speed and versatility of this outstanding automatic lathe. Perhaps we can help cut your costs, too.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin



THE GISHOLT NO. 12 HYDRAULIC AUTOMATIC LATHE

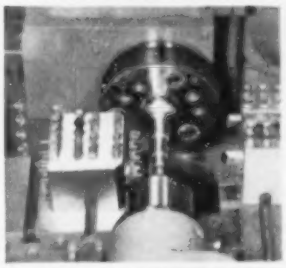
THESE 17 SURFACES

— machined in 4 different operations —
on 8 similar parts in this order

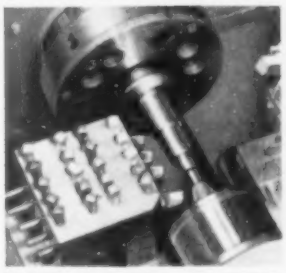
Hold between centers using Gisholt Work Driver.



OPERATION 1—Rough turn Q-M-L with tools on the Front Carriage. Rough face K-N with tools on the Rear Slide.



OPERATION 2—Rough turn B-F-H with tools on the Front Carriage. Reugh face D-J with tools on the Rear Slide.



OPERATION 3—Finish turn B-F-H with tools on the Front Carriage. Finish face D and groove C, finish face J, and chamfer A-E-G with tools on the Rear Slide.



OPERATION 4—Finish turn Q-M-L, and face P with tools on the Front Carriage. Finish face K-N, size O, and chamfer R with tools on the Rear Slide.

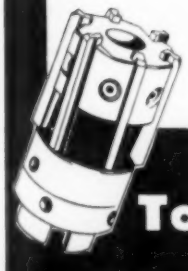


THE GISHOLT ROUND TABLE represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Ever use a really free cutting reamer?

TRY WAUKESHA'S SHELL OR SHANK TYPE *with* "CUSHION - LOCKED" ADJUSTABLE BLADES



For standard and heavy-duty work
Sizes up to 6¼" in stock
Larger sizes on application

WAUKESHA Tool Corporation

1424 Arcadian Avenue WAUKESHA, WISCONSIN

SPECIAL CUTTING TOOLS MADE PROMPTLY...

Accurately



CARBIDE TIPPED OR H.S. STEEL

Special cutting tools of all types are a specialty at Detroit Reamer & Tool Company. All carbide-tipped tools are supplied with high speed steel bodies.

Included in our modern equipment are Circularity-Grinding Attachments. Circularity relief can be ground on any special tool, when specified, at no additional cost.

Our engineering department is at your disposal to help solve cutting tool problems.

D R & T COMPANY

DETROIT REAMER & TOOL CO.

Mfrs. of Special High Speed Cutting Tools

2830 East 7 Mile Rd. Detroit 12, Michigan



How TO MAKE TAPS AND REAMERS LAST LONGER!

Made to Fit Any Machine

Furnished with male or female taper, straight threaded or special shanks to fit any machine used for tapping or reaming.

Just because taps and reamers may seem to be worn out is no proof that they really are. It may be that the trouble is not with the tap or reamer itself but rather with the tool holder

This is where the Ziegler Tool Holder comes in. By compensating for inaccuracies in aligning the work with the spindle, it eliminates the over-size and bell-mouthed holes that are often wrongfully blamed on the cutting tool.

Change over to Ziegler Tool Holders and see how much longer you can keep your taps and reamers in service.

W. M. Ziegler Tool Co.
13570 Auburn
DETROIT 23, MICH.

WRITE FOR CATALOG

Ziegler ROLLER DRIVE **FLOATING HOLDER** *for* **Taps** *and* **Reamers...**

A head start



—in cutting costs with SUPER-FINISH Universal Drill Bushings

There's longer life in Universal Standard Drill Bushings because the bores are Super Finished. These Super Finished bores *reduce tool breakage and drill wear*, eliminate galling, have no sharp edges on which tools can hang up. Standard sizes available for immediate shipment. Universal warehouses at 89 Main St., Ansonia, Conn., and 5629 Sixth St., Kenosha, Wis., offer *prompt sectional delivery and information.* Cut production costs by specifying Universal Drill Bushings.

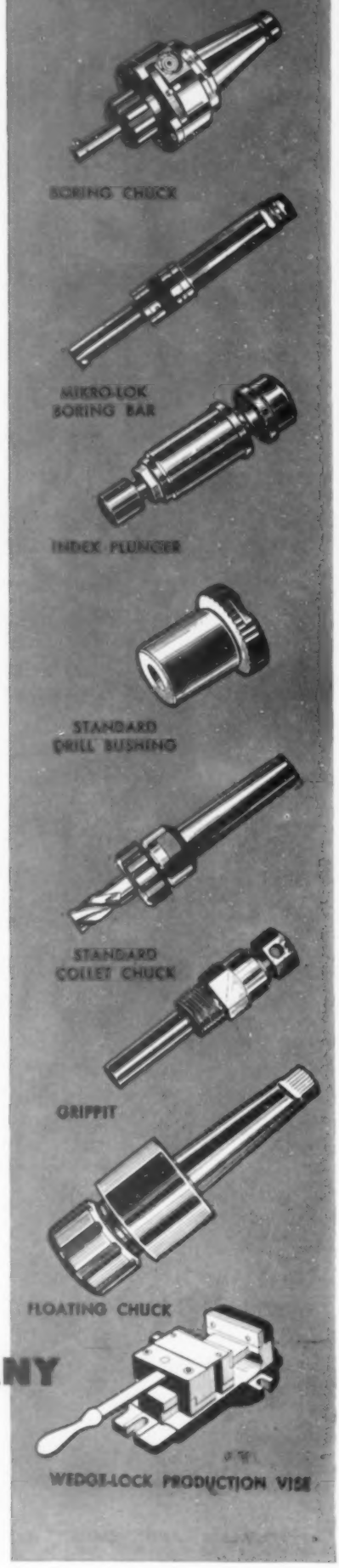


UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 3, MICHIGAN

Facilities available for special hardened and ground precision parts made to customer specifications.

OTHER UNIVERSAL PRODUCTION TOOLS



A note on Abrasives

Producing more Abrasives to higher standards ...and what it means to you





In mill, plant and shop, abrasives are continuing to assume greater importance as tools to produce more and better products at lower cost. New technical developments are requiring the use of abrasives in quantities beyond the production capacity of a few years ago. And, new alloys, different materials, faster production techniques and more exacting engineering requirements are calling for improved abrasive products of superior quality. To meet these demands, The Carborundum Company has marshalled all of its specialized technical knowledge, manufacturing resources and service facilities. The bonded abrasive or coated abrasive of today resembles its predecessors of yesterday in general appearance only. It is a different and better tool. It is designed to far more exacting specifications. Its basic ingredients are improved. It is made by newly developed methods. Abrasives by CARBORUNDUM are now produced in larger quantities in new and recently expanded plants to meet our customers' increased abrasive requirements. If you are looking for assurance in obtaining the best in abrasives, and abrasive service, follow this simple rule: specify abrasives by CARBORUNDUM.

The Carborundum Company, Niagara Falls, New York.



The only complete line of Abrasive Tools is

CARBORUNDUM

TRADE MARK

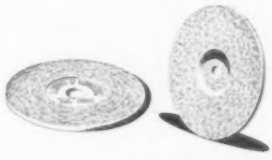
"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company

Engineering News
ON ABRASIVE PRODUCTS

MX Discs and MX Depressed Center Wheels Offer Advantages in Many Applications

Fast cutting... long life... ease in use... and, safety—these are four reasons why MX Discs and MX Depressed Center Wheels by CARBORUNDUM are getting increased use. Their sharp cutting action and extra durability are especially desirable on operations that prove too heavy for ordinary sander discs. They are particularly effective on rough jagged surfaces presenting a severe dressing problem. They are also effective on such jobs as smoothing castings and welds, stock removal and clean-up work, where wearability rather than extreme flexibility is the important factor. They are usable down to practically the arbor hole.

MX Discs and Wheels by CARBORUNDUM are available in 7" and 9⅛" diameters for use on all standard portable disc sanders, air or electric. To obtain maximum safety, full sander pad support is recommended. The D2N.S. sander pad is provided for this purpose.



Correct Selection of Abrasive Grains Results in Improved Polishing

The abrasive grain is the key to uniform finish in polishing a metal surface. For this reason, different types of abrasives by CARBORUNDUM have been developed, with definite characteristics, to provide efficient performance under varying conditions.

ALOXITE TP aluminum oxide grain is tough and blocky. It gives excellent service on operations involving considerable stock removal and is recommended for polishing all types of steel and other metals of high tensile strength.

ALOXITE TPT grain is also used where the removal of large amounts of metal is desirable. It is extra tough and sharp, treated to assure effective adhesion with cold cement or glue.

ALOXITE TPC grain is of medium sharpness and is treated to assure effective adhesion with cold cement.

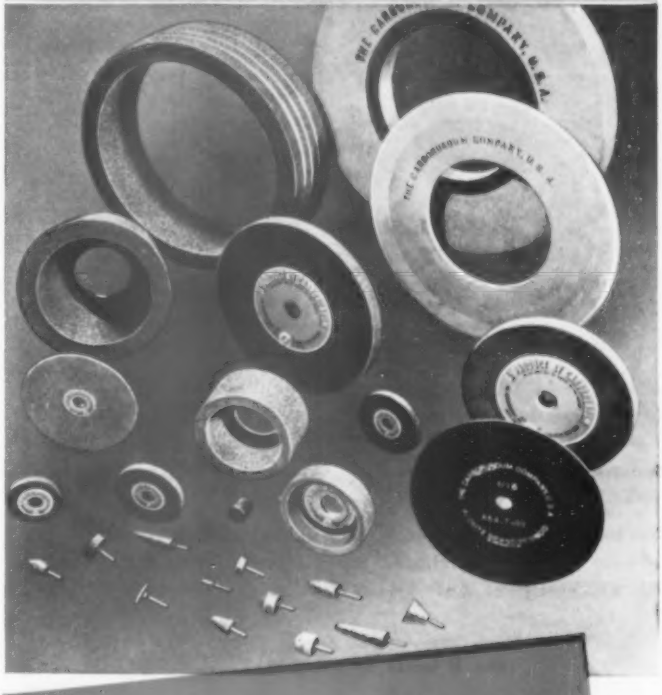
ALOXITE TPL is extremely sharp and friable. Due to its friable nature, it fractures during use, constantly presenting new sharp-cutting edges to the work surface. Loading is minimized. It is ideal for polishing metals of low tensile strength.

Accurate grading assures a uniform size, free from oversize material that cause deep scratches, and free from an excess of finer materials that tend to slow production. The angular shape assures maximum cutting edges. Flats and slivers, with no cutting value, are eliminated. Through chemical and physical controls, grains of uniform strength and temper are assured.



COATED PRODUCTS — SHEETS • ROLLS • BELTS • DISCS SPECIAL SHAPES

BONDED PRODUCTS — ABRASIVE WHEELS • STICKS, STONES AND RUBS • SPECIALTIES • SUPERFINISHING STONES • SPECIAL FORMS • ABRASIVE GRAINS AND FINISHING COMPOUNDS



FOR EVERY ABRASIVE APPLICATION
...CALL IN
CARBORUNDUM
TRADE MARK

WANTED Alloy $crap

YOUR Broken TOOLS STILL HAVE A VALUE!

SCRAP **18-4-1 HIGH SPEED STEEL** SCRAP

Herman A. Graff & Sons, Inc., will pay you on the basis of the *Alloy* in your scrap. We are Alloy Scrap specialists. We want and will buy Scrap Metal containing the Alloys now in great demand. You will be paid for the *Scrap Value*. We sort—you save.



HIGH SPEED STEEL
STELLITE AND
STELLITE TYPES

Furnace Castings
Heating Elements

We Pay for

Scrap Value

We Sort—

You Save

FOR THE PAST 36 years we have been nationwide dealers and brokers in the scrap metal field, specializing in TUNGSTEN HIGH SPEED STEEL, STELLITE and STELLITE TYPE SCRAP, NICKEL, NICKEL ALLOYS.

We have equipment for handling a small or a large volume with the efficiency you'll appreciate. LET US SOLVE YOUR SCRAP PROBLEM!

Turn Your Alloy Scrap into the Wheels of Progress!

Herman A. Graff
AND SONS, INCORPORATED
Pioneers in Metal Specialties Since 1912
1223-25 WEST 69th ST. CHICAGO 36, ILL.

"The STANDARD of COMPARISON for QUALITY and ACCURACY"



American DRILL JIG BUSHINGS

FIRST in QUALITY & SERVICE

Yes, first for quality—American Drill Bushings, precision made from finest oil hardened tool steel, wear longer and give maximum jig drilling accuracy. Concentric ground lead insures perfect alignment, speed and safety. Complete stocks maintained at all times by exclusive distributors throughout the U.S. and Canada for immediate free delivery.

IMMEDIATE DELIVERY!
BUY AMERICAN - SEND FOR CATALOG D-5

American Drill Bushing CO., INC.
1110 So. Santa Fe Avenue, Los Angeles 21, Calif.
SPECIALIZING ONLY IN DRILL BUSHINGS

EFFICIENCY IS UP COST IS DOWN

WHEN YOU SPECIFY
RUTHMAN GUSHER
COOLANT PUMPS
ON YOUR MACHINES

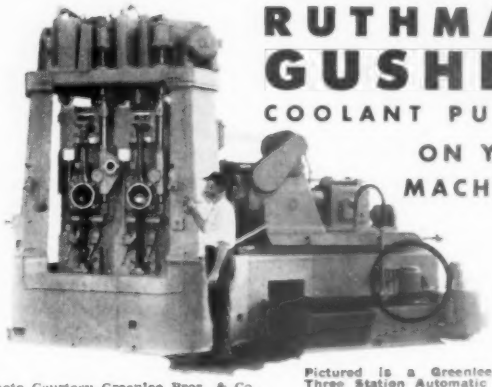


Photo Courtesy Greenlee Bros. & Co.

Pictured is a Greenlee Special Three Station Automatic Indexing Machine for Facing Differential Axle Housings, equipped with 1 H.P. Model 11025 Long Ruthman Gusher Pump.



Any way you look at it Ruthman Gusher Coolant Pumps give you better service.

Efficient, they deliver full flow of coolant instantaneously.

Economical to operate, they consume less power when throttled.

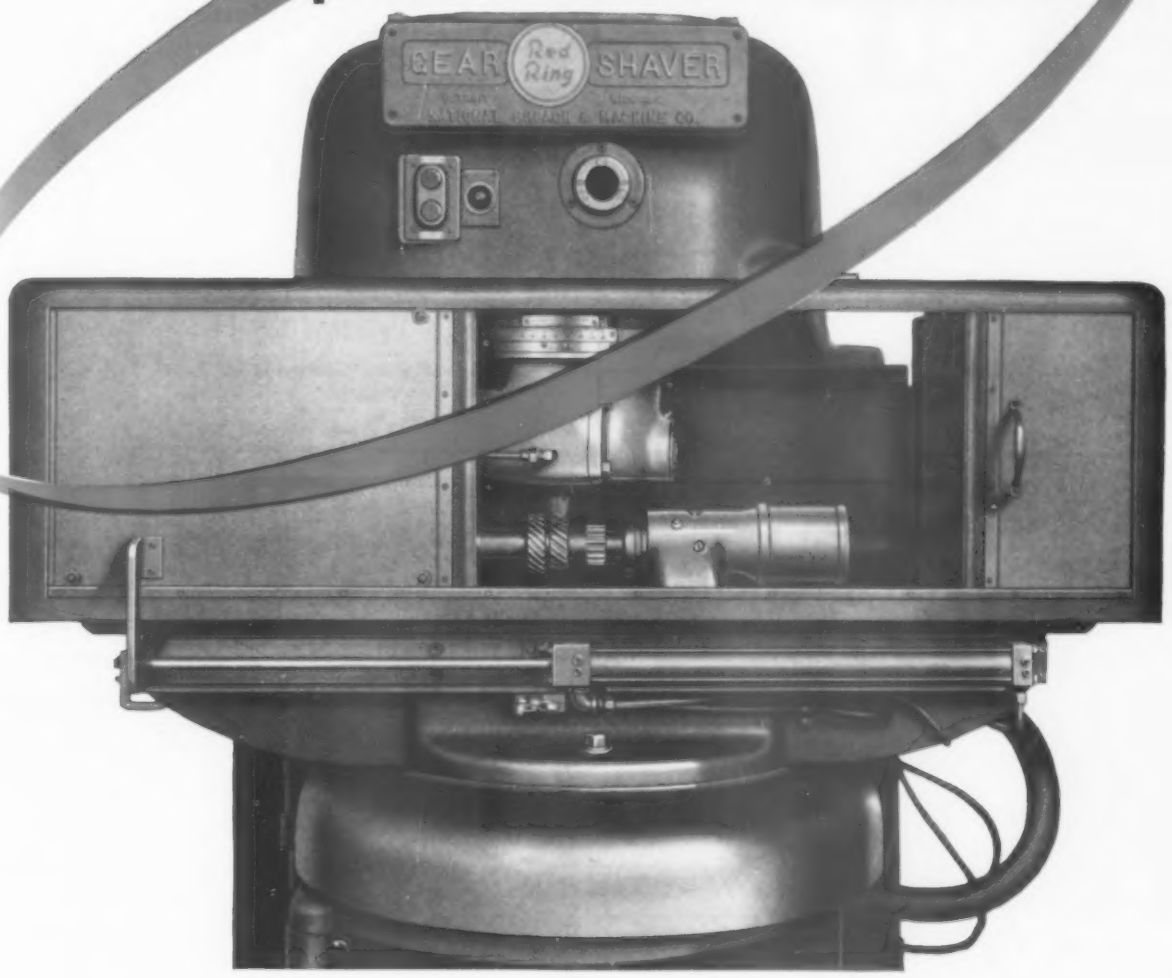
Low in maintenance cost, they give you year after year of trouble-free service, the reason, precision balance.

Write us for our new catalog today.

THE RUTHMAN MACHINERY CO.

1810 Reading Rd. Cincinnati, Ohio

SEMI-AUTOMATIC operation speeds GEAR SHAVING



Two new Red Ring developments make it practicable to put gear shaving on a semi-automatic basis and increase production rates substantially.

These are the air operated tailstock and the air operated, electrically controlled automatic splash doors. The former clamps the work gear quickly and accurately in shaving position. After loading the operator presses a start button which automatically closes the splash doors, starts the flow of coolant and the automatic shaving cycle. When this cycle is completed, coolant is cut off and the doors open automatically for unloading.

For small gears, this reduces loading time up to 50% and on all gears it minimizes operator fatigue.

Write for details and quotations.

SPUR AND HELICAL
GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORM



NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN • • • • • • • • • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

DEPENDABLE ACCURACY

INSPECTION TOOLS made of MEEHANITE METAL are designed to fill your various Inspection and Checking needs.



Surface Plates
Box Parallels
Slotted Angle Plates
Universal
Right Angles
Flat Parallels
Lapping Plates
Toolmakers' Knees
Straight Edges
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Angle Attachments

Also
Surface Plates
Rescraped
Like New

PRACTICALLY INDESTRUCTIBLE!

ACME BENCH VISES have ALL these features



Maximum Gripping Power
Longer Vise Life
No Side Twist or Wobbling
Unbreakable Sleeve Unit
Interchangeable Ground Jaws
Swivel Bases
11 Sizes from 2" to 6"

Also ACME COMBINATION PIPE AND BENCH VISES with same outstanding features available in 3½" — 4½" — 5" Jaws.

WRITE FOR LITERATURE

PRECISION PRODUCTION TOOLS

ACME TOOL COMPANY

75 West Broadway New York 7, N. Y.

PROMPT DELIVERY

Improve Product *Quality* Without Re-tooling

Sturtevant Sensory TORQUE WRENCH
[-HEAR-FEEL-SEE-]



Without changing design, re-tooling, changing materials or incurring major expense or delay, many manufacturers are improving the quality and performance of their products—are eliminating chatter, binding, loosening, leakage, thread stripping etc.—by torquing all critical nuts, bolts, screws and threaded parts.

With STURTEVANT Permanently Accurate Torque Wrenches you can *assemble* to close tolerances of torque, can avoid over stressing and damaging strains. As easy to use as an ordinary socket wrench, Sturtevant Sensory (High Speed Production) Wrenches *save assembly time* while *improving product quality*.

Write for Bulletin SW41

PA STURTEVANT CO.
ADDISON QUALITY ILLINOIS

Columbia TOOL STEEL

LOW COSTS—
With economical production the watchwords of the day, the value of good tool steel is increasingly important.



COLUMBIA TOOL STEEL COMPANY
ARTHUR T. CLARAGE, PRESIDENT
MAIN OFFICE AND WORKS
520 EAST 14TH STREET • CHICAGO HEIGHTS, ILL.

MONEY-SAVING REASONS

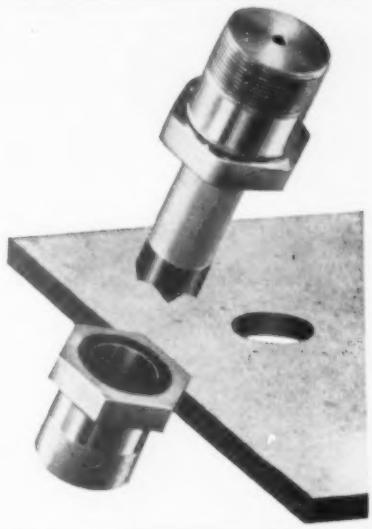
. . . FOR THE SWING TO CARBOLOY® PRESS DIES!



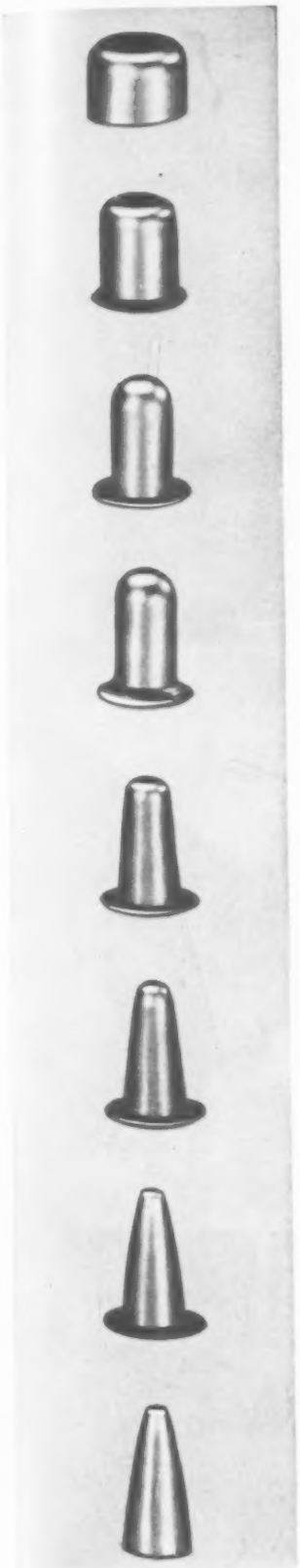
When the manufacturer of these metal door knobs switched from steel to Carboloy dies, die life increased *ten times*—and at latest reports, the Carboloy sheet metal dies still needed no polishing!



5,000,000 rod bearings were formed with Carboloy dies, *without refinishing the dies!* Savings to date: the cost of 7 steel dies, 44 maintenance hours—and the Carboloy sheet metal dies are still going strong!



After 380 hours of punching plaster wallboard, this Carboloy punch and die showed only .0025-.003" wear. Steel punches wore .012" to .015" in half the time, only lasted one-twelfth as long.

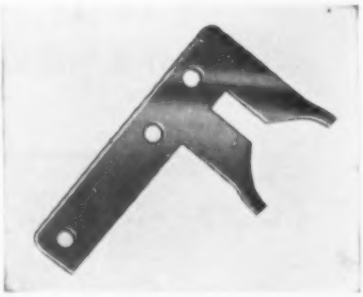


600,000 Inconel pencil points were drawn by Carboloy dies—without polishing! And with the same dies 125,000 stainless steel points have been drawn to date—with no measurable wear!

You can get the same amazing results

A Carboloy engineer will gladly call on you, at your convenience, to help you with any die problem. Send for the Carboloy DIE ENGINEERING MANUAL, D-124, to find out more about the advantages Carboloy Cemented Carbide sheet metal dies can give you.

CARBOLOY COMPANY, INC.
11101 E. 8 Mile Street **Detroit 32, Michigan**



Before sharpening, 2,200,000 strokes were made on the Carboloy die for blanking these electric motor laminations! Steel dies averaged only 100,000 strokes on each sharpening.

SPECIFY FOR ANY KIND OF PRESS-DIE WORK

CARBOLOY®
CEMENTED CARBIDE



You Cut Production Costs .... if You use ....

STRENGTH · TOUGHNESS · UNIFORMITY · ENDURANCE

SIFCOLOY

CONTROLLED METAL CASTINGS

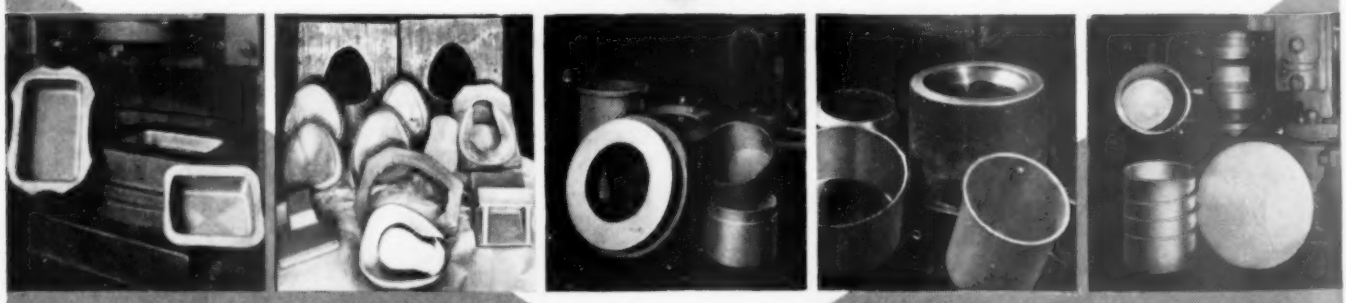
WHAT SIFCOLOY IS . . .

SIFCOLOY Metal is a development in the manufacture of cast iron that involves a special technique in charging, melting, and control of the molten iron before pouring. Therefore, the intrinsic nature of SIFCOLOY Metal is controlled to meet the type of service for which the specific castings are to be used. For this reason, SIFCOLOY Metal is made in 5 basic grades each varying in physical properties.

WHY SIFCOLOY CASTINGS ARE BETTER

1. SIFCOLOY has greater tensile and compressive strength than ordinary grey iron and is *heat treatable.* (Grades SI and SIA)
2. SIFCOLOY, though much closer grain, is readily *machinable.*
3. SIFCOLOY is adaptable to a wide variety of dies, plates, and cast machinery parts. (See photos below)
4. SIFCOLOY is made in 5 basic grades to fit your individual needs.
5. SIFCOLOY affords longer life . . . due to its greater wear resistance, hence cuts your production costs.

Showing varied use of SIFCOLOY Dies for Stamping, Drawing Plain Carbon and Stainless Steel Sheets and Compression Molding of Plastics



REFRIGERATOR PAN | BED PAN | GARBAGE CAN | WATER PAIL | BEER BARREL

"Sifcoloy Metal for Better Castings and Better Costs!"

WRITE FOR COMPLETE INFORMATION

SPUCK IRON and FOUNDRY CO.

3145 N. FOURTEETH ST. • • • ST. LOUIS 7, MO.

the A-B-C's of SCULLY-JONES ARBORS



Absolute Accuracy

Better Service

Continual Cost Reduction

Absolute Accuracy, as well as stamina, are assured in long production runs, because of the careful heat treating and grinding of Scully-Jones Arbors, at every step from rough forgings to finished tool.

Better Service to you, because large stocks of Scully-Jones Arbors are maintained from which your requirements can be filled immediately.

Continual Cost Reduction is accomplished by Scully-Jones Individual Arbor Set-Ups.

Standard Arbors for all machines having N. M. T. B. Tapers. See Pages 112 and 114, Scully-Jones Catalog No. 500, for Style A and B Arbors. Send drawings or specifications for prompt quotations on special arbors.

Refer to the Scully-Jones Catalog showing over 500 types and sizes of cutting tools, collet chucks, boring equipment, centers, etc.

Scully-Jones AND COMPANY

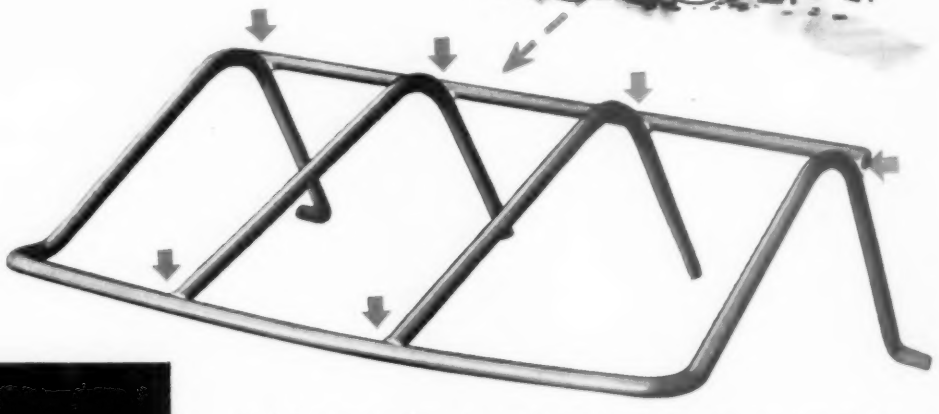
2056 **1915 SOUTH ROCKWELL STREET • CHICAGO 8, U.S.A.**

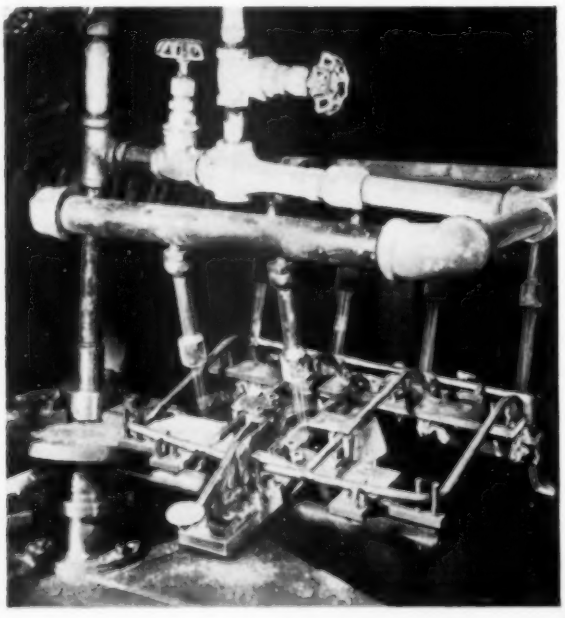
FOR FAST PRODUCTION OF TUBULAR ASSEMBLIES BRAZE WITH EASY-FLO

You can get any production you need on tubular assemblies by brazing with the fast-acting, free-flowing, low-temperature silver alloy EASY-FLO. All it requires is a fast handling and heating setup in which parts are assembled for brazing with EASY-FLO preplaced. With such set-ups many manufacturers of bicycles, motorcycles and other products made of tubing, have substantially increased production and reduced costs.

HERE'S AN EXAMPLE—a package rack for baby carriages, made of tubular steel.







At left you see the set-up for brazing the racks—3 jigs which rotate around a central mounting, with city gas-air burners over one station. Cleaned and fluxed parts are set in the jigs with a ring of EASY-FLO 45 wire preplaced at each joint. Note, a flame is directed at each of the six joints, brazing them all at once—*time 45 seconds*. While one assembly is brazing, others are being prepared. The result is, a steady stream of reliably brazed racks.

BULLETINS 12-A AND 15 give full details about EASY-FLO brazing—including the reasons for its exceptional speed and reliability in joining metals with single-piece strength. Write for these informative bulletins today.

HANDY & HARMAN

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Bridgeport, Conn. • Chicago, Ill. • Los Angeles, Cal • Providence, R. I. • Toronto, Canada

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Save Man-Hours . . . *Save* Money . . .

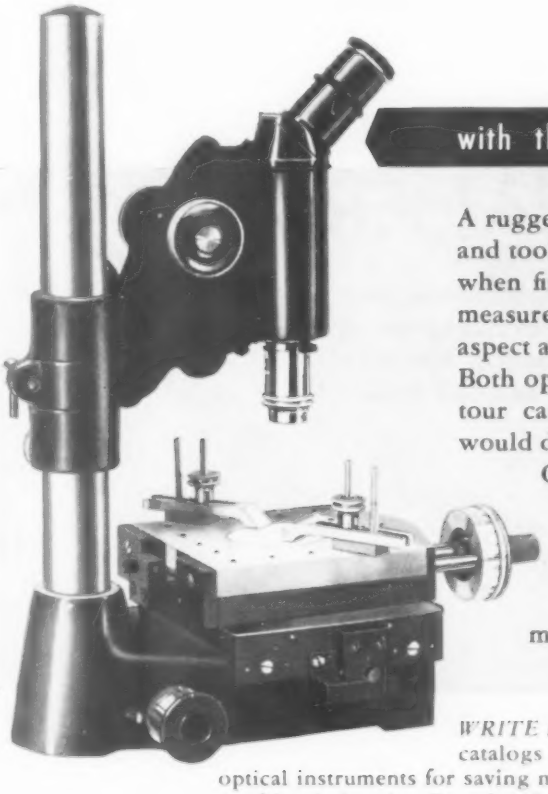
In Producing and Inspecting Tools and Finished Parts



with the Bausch & Lomb CONTOUR MEASURING PROJECTOR

No other projector gives you this accuracy. With the protractor screen, all angular measurements can be read to ± 1 minute of arc (1′). Direct linear measurements, reading to ± .0001″, can be made by means of the cross slide stage. The projected, magnified image of the object on the ground glass screen is sharp, and well defined.

Dimensions, angles, and profiles of production-run parts can be compared directly with a traced outline of the projected image of the master part, or with a large scale drawing superimposed on the screen. Inaccuracies are located quickly and simply. Catalog D-27.



with the Bausch & Lomb TOOLMAKERS' MICROSCOPE

A rugged shop instrument especially designed for the machinist and toolmaker. It is used for precision linear measurements and, when fitted with the protractor eyepiece, for precision angular measurements. Objects and movements are seen in their natural aspect and direction . . . not reversed as in ordinary microscopes. Both opaque and transparent objects of regular or irregular contour can be measured. It is ideal for measuring parts which would distort under pressure of the most delicate instruments.

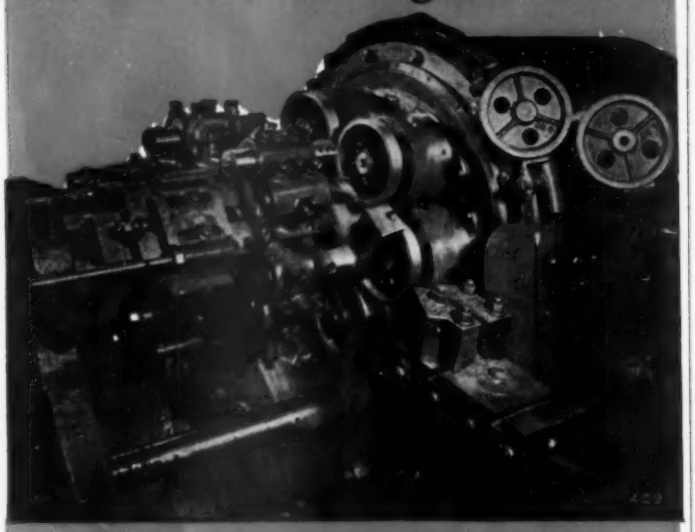
Operation is exceptionally simple and fast. Linear measurements to ± .0001″ can be made by means of the cross slide stage, controlled by two micrometer screws, and angular measurements to ± 1 minute of arc (1′). Various other attachments are available to meet special measurement problems. Catalog D-22.

WRITE FOR COMPLETE INFORMATION . . . The above listed catalogs illustrate and describe these and other Bausch & Lomb optical instruments for saving man-hours, and maintaining accuracy standards in metal working industries. Bausch & Lomb Optical Co., 763-D St. Paul St., Rochester 2, N. Y.

BAUSCH & LOMB

OPTICAL COMPANY ROCHESTER 2, N.Y.

fact: gear blanks are turned with accuracy and speed on Baird Automatic Chucking Machines!

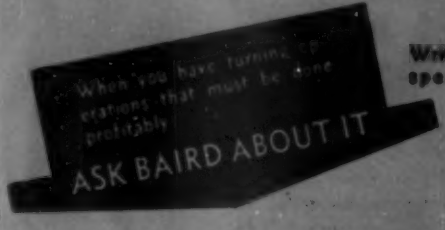


You need a Baird Automatic Chucking Machine in your shop if you have turning operations that must be done profitably. *That's been a fact since the turn of the century!*

You need a Baird because it is the one machine that you can depend upon, friend of the tool engineer and shop superintendent alike because of its speed and accuracy.

The machine illustrated above shows why! Here facing, turning and boring gear blanks is combined in one operation. The tolerances were close, the stock was hard but Baird maintained accuracy and set new production per hour records.

Here the special Baird feature of selection of spindle speed for each position proved its value: high spindle speeds were selected in the finishing positions so that carbide tools could be used to produce the fine accurate surfaces demanded.



Write us for complete specifications of the many Baird Automatic Chucking Machines.

THE BAIRD MACHINE COMPANY, STRATFORD, CONN.

Acme Offers Complete Facilities for

PRECISION GRINDING

FAST SERVICE... LOW COST

- INTERNAL
- EXTERNAL
- CRUSH FORM
- CENTERLESS
- TWIN DISC
- SURFACE
- THREAD

Acme is equipped to handle all types of precision grinding. Expert craftsmen, using newest methods and modern equipment, will do the job for you faster, better, more economically. Acme also offers a flat lapping service that can finish surfaces to within millionths. Write for details.

Acme Industrial Company

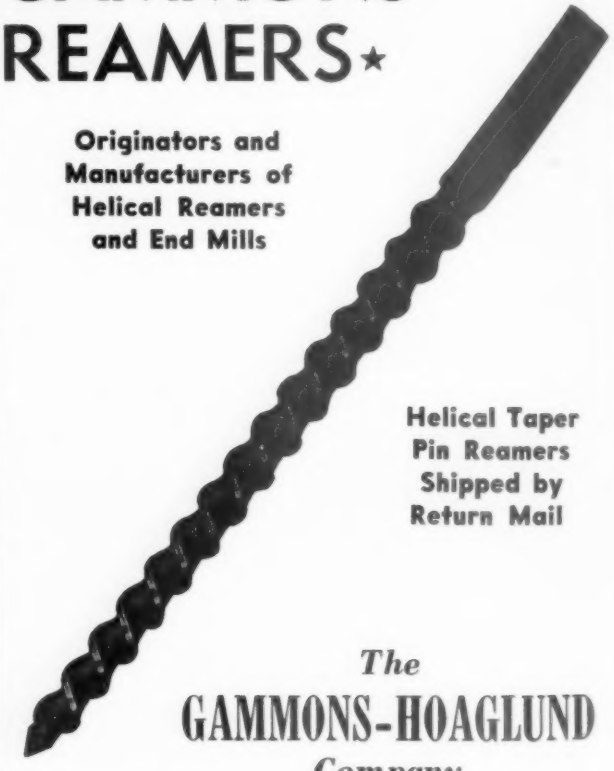
Makers of Standardized Jig & Fixture Bushings

200 N. LAFLIN STREET • CHICAGO 7, ILLINOIS

THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

GAMMONS REAMERS★

Originators and Manufacturers of Helical Reamers and End Mills



Helical Taper Pin Reamers Shipped by Return Mail

The

GAMMONS-HOAGLUND *Company*

400 Main Street, Manchester, Conn.

SELECTED DISTRIBUTION





- DRILLS
- REAMERS
- CARBIDE TOOLS
- COUNTERSINKS

Double Circle Tools

FOR MORE HOLES PER GRIND

CALL YOUR LOCAL DISTRIBUTOR



CHICAGO LATROBE

411 WEST ONTARIO ST.
CHICAGO 10, ILLINOIS

NEW YORK PHILADELPHIA LOS ANGELES

New Heald Centerless Internal

LOADS AND UNLOADS IN ONE SECOND !

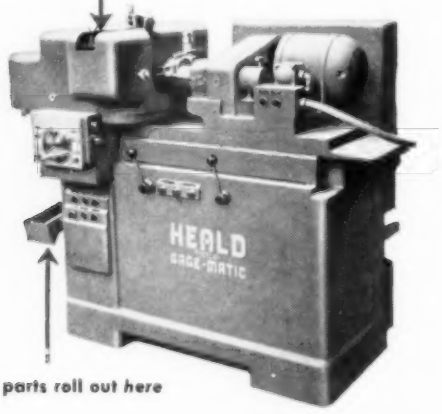
...new development speeds up your centerless grinding cycle

If you are grinding work that can be rotated on its own outside diameter, you are probably already familiar with the centerless principle of internal grinding—an exclusive Heald development. Today, on the Heald Model 181 Centerless, this principle has been further refined by a new method of still faster loading and unloading.

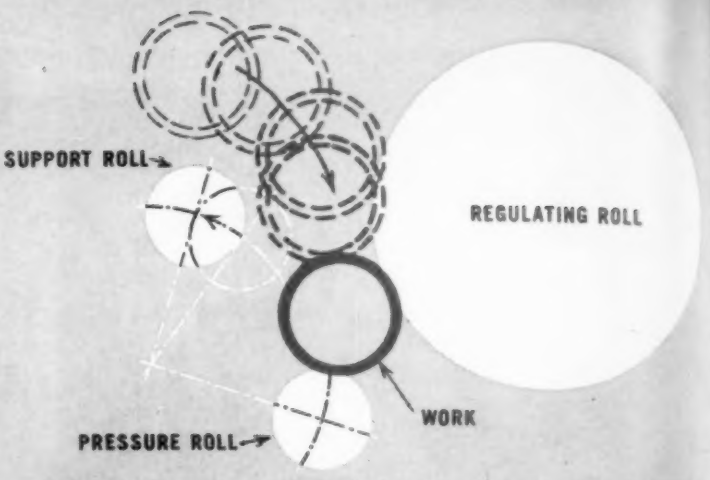
The diagrams at the right show how the work is fed into grinding position, and automatically unloaded by gravity. The entire loading and unloading operation has been reduced to one second! This means that the 181 spends less time grinding air. It also means that the entire grinding cycle may be shortened by as much as 15%.

This new development is typical of the production-minded engineering back of every time-saving, effort-saving feature of the new Heald machines. Your nearest Heald representative will be glad to study your precision finishing problems and recommend the right machine for the job.

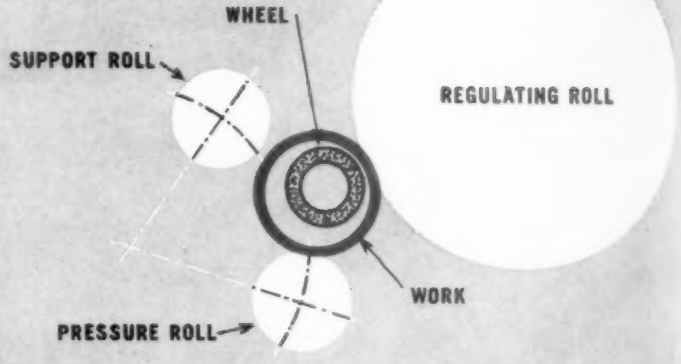
Completely automatic—work enters here



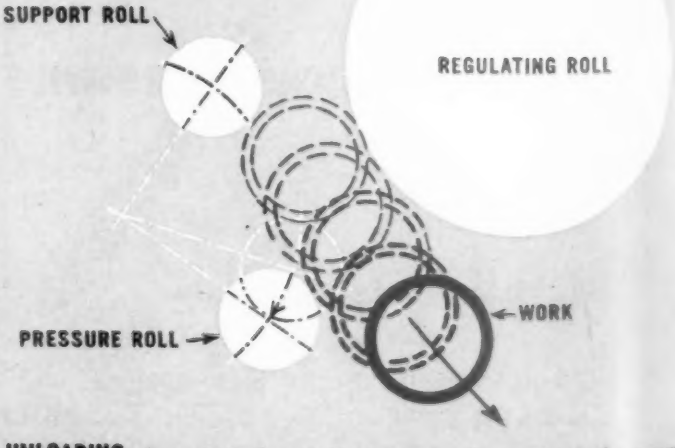
Finished parts roll out here



LOADING. At the start of each cycle, the upper support roll shifts to the left, allowing the part to drop into place between the pressure roll and the regulating roll.



GRINDING. The support roll then moves back to the right, into the grinding position, accurately locating the part, which is rotated on its own O.D. between the three centerless rolls.



UNLOADING. As soon as the grinding operation is completed, the pressure roll shifts to the left, allowing the work to drop down into the unloading chute. The pressure roll instantly moves back into position and the cycle is repeated.

HEALD

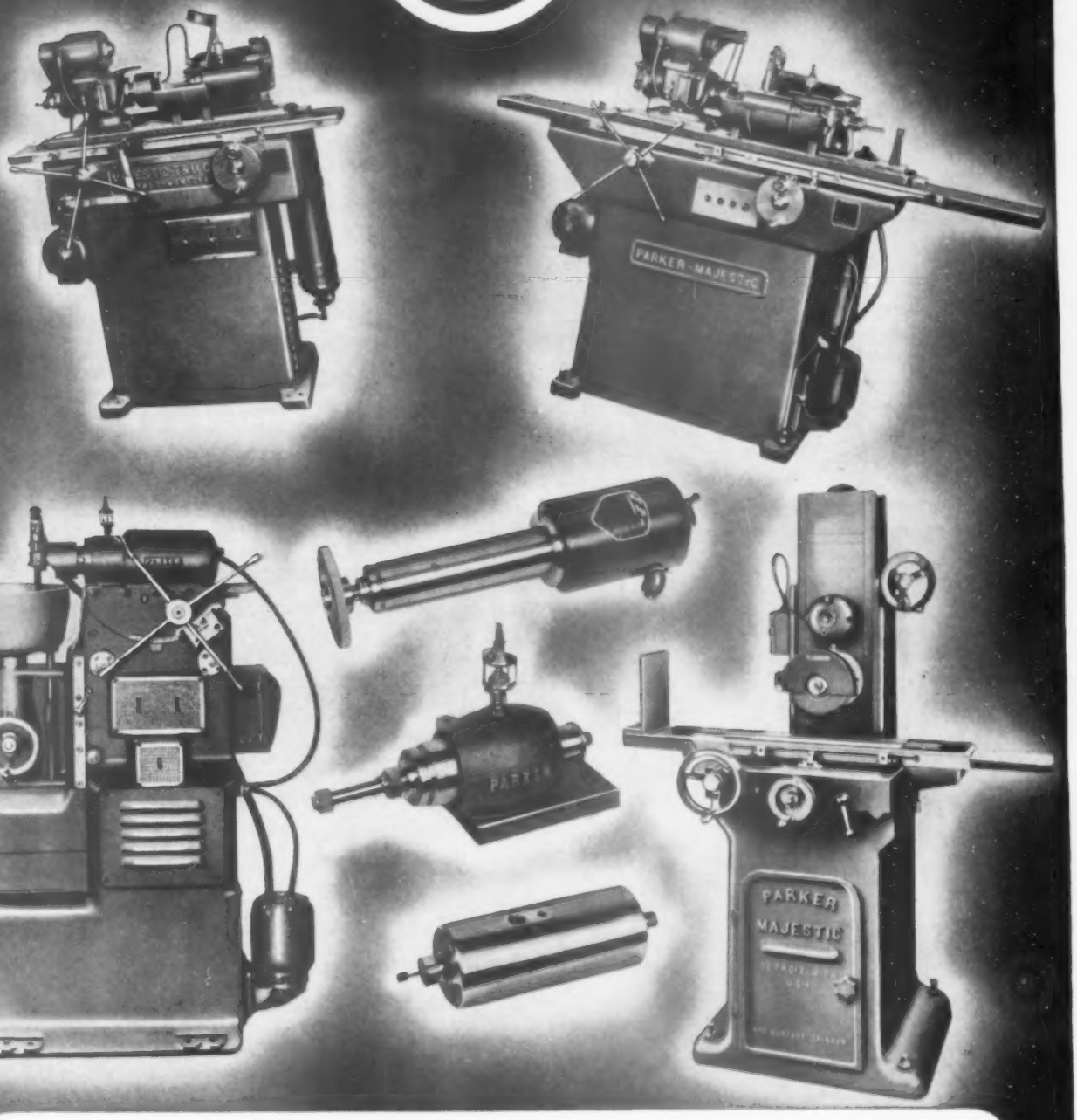
PRECISION INTERNAL AND SURFACE GRINDERS

PRECISION BORE-MATIC FINISHING MACHINES

THE HEALD MACHINE COMPANY
Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton • Detroit
Indianapolis • Lansing • New York

PRECISION MACHINES pm PARKER • MAJESTIC



Since 1907, the name of Parker has been a part of the progress of the automobile industry.

In 1915, Parker introduced the basic principle of ball bearings in grinding manufacture—a major advance in grinding which was unknown at that time.

A few years later the Parker Ball Bearing was patented to meet high speed and precision requirements and has been in use ever since.

Further research and engineering development brought forth the well-known Parker Majestic External and Internal Grinding Machines, each machine representing a great advance in simplicity of operation and precision.

The latest tooling development of the company is the Parker Majestic No. 2 Surface Grinder that provides new accuracy and flexibility for small grinding operations.

These many products of Parker Majestic will continue to serve the great automotive industry in the future, keeping pace with its demands for speed, accuracy and dependability.

MANUFACTURED BY

MAJESTIC TOOL AND MANUFACTURING COMPANY

147 JOS CAMPAU • DETROIT 7, MICHIGAN

FOR INTRICATE FORM-TOOLS

–close tolerances–quick delivery

–send specs to **J&S**



J & S Tool Company makes the most intricate types of form-tools to the closest tolerances for many of the leading manufacturers. Among the types that we produce are: counterbores, broaches, circular form-tools, hollow mills, gun drills, flat drills, end cutters, boring tools, step drills, watch tools, cold heading dies, recess tools, spiral form-tools, taper reamers, etc. Save time and money by sending your specs to J & S.



Also manufacturers of Fluidmotion and Form Master Radius and Angle Dressers, and J and S Jaw Clamps.

J&S TOOL CO., INC.

485 Main Street, East Orange, N. J.

Representatives in Principal Cities

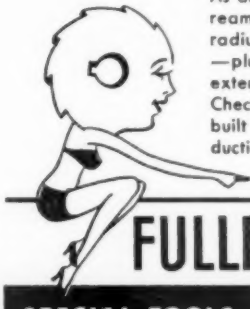
Machine **MULTIPLE DIAMETERS–**

in **ONE OPERATION**

with SUBLAND TOOLS

and Cut Production Costs





As an example: the tool pictured at left, above, reams and counterbores a 1.375 hole, forms a radius and reams a 1.750 hole *all in one operation* —plus the economy of easy resharpening and extended tool life available with subland design. Check and see if a subland tool, designed and built under Fuller supervision, will not cut production costs for you.

"BETTER" if it's made by FULLER!

SKILLED CRAFTSMEN

FULLER TOOL *Co.*

SPECIAL TOOLS • PRECISION MACHINING

GUILD

3956 WEST ELEVEN MILE ROAD
BERKLEY • MICHIGAN

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SWARTZ LS TYPE FIXTURE

A spring jig with solid clamping, as built only by Swartz. A heavy die spring prevents parts loosening if heavy drill pressures force the work lower into the adapters.

ASK FOR CATALOG NO. 941

SWARTZ TOOL PRODUCTS CO., INC.

13330 Foley Avenue — **Detroit 27, Michigan**

Cleveland—Production Tool Co.
Milwaukee—Geo. M. Wolff Co.
Houston—Engineering Sales Co.
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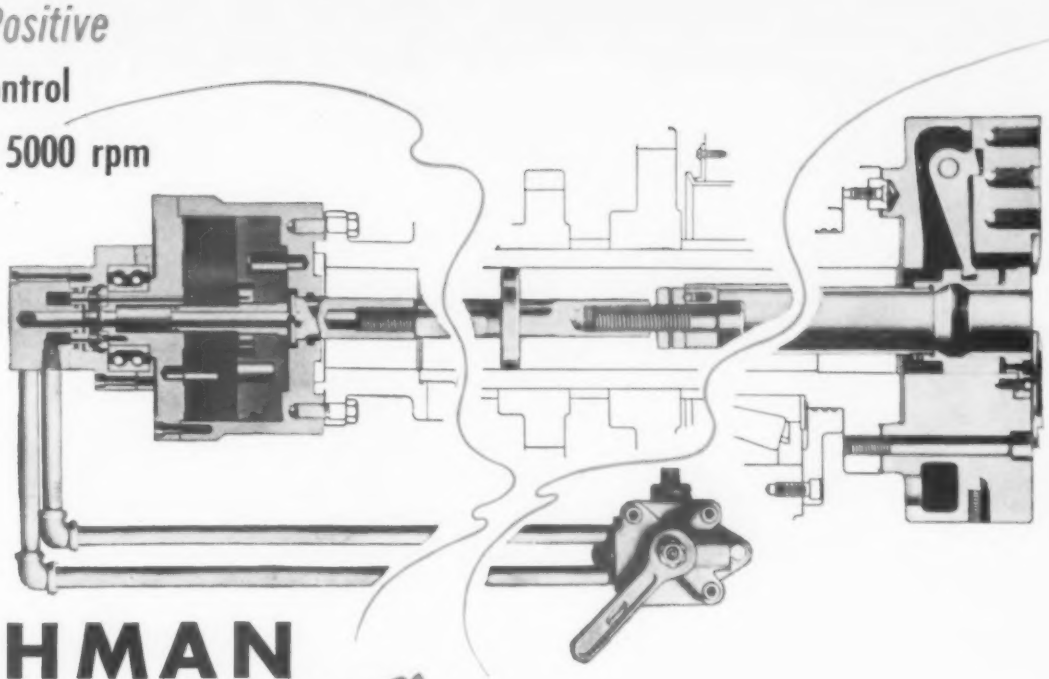
Canada—Hi-Speed Tools, Ltd., Galt, Ont.
Boston—A. R. Shevlin Co.
Los Angeles—Wade Edgar

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Philadelphia, Pa.—Morgan Tool & Equipment Co.
Cincinnati—R. W. Pratt

Faster . . . . Positive

Action *and* Control

at Speeds to 5000 rpm



CUSHMAN *Rotating* AIR CYLINDERS

A FEATURE OF CUSHMAN POWER CHUCKING EQUIPMENT

The high r.p.m. of air cylinders for control of chucks, mandrels and other air operated devices mounted on spindles, posed a problem that Cushman engineers have solved . . . and we now present the new Cushman High Speed Air Cylinders for use with Cushman Power Chucks . . . and with other makes as well.

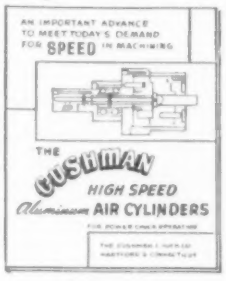
Precision aluminum alloy construction lowers weight to a minimum . . . gives low flywheel effect . . . long service.

Balanced air pressure on both sides of air seal minimizes leakage . . . means faster action, more positive control, time saving on short run operations.

After assembly the entire cylinder is statically balanced for smooth operation.

For advanced machine tool applications in sizes from 3¼" to 12". Specify Cushman Power Chucking Equipment . . . for new or present machines.

Write for **BULLETIN**



THE CUSHMAN CHUCK COMPANY

Hartford 2, Connecticut

Consult CUSHMAN

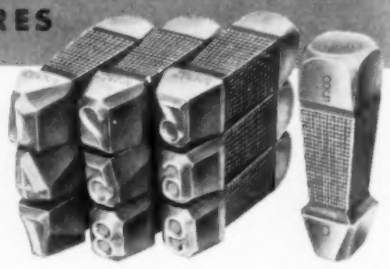
Chucking Engineers Since 1862

HMAN also manufactures a complete series of NCH OPERATED CHUCKS te for Catalog 63 and Bulletins

For Maximum Safety in Stamping—

"SAFETY" Wedge Grip

STEEL LETTERS AND FIGURES



- No mushroom
- No spall
- 25% to 50% more service
- More Safety!
- Pat. No. 2,089,794



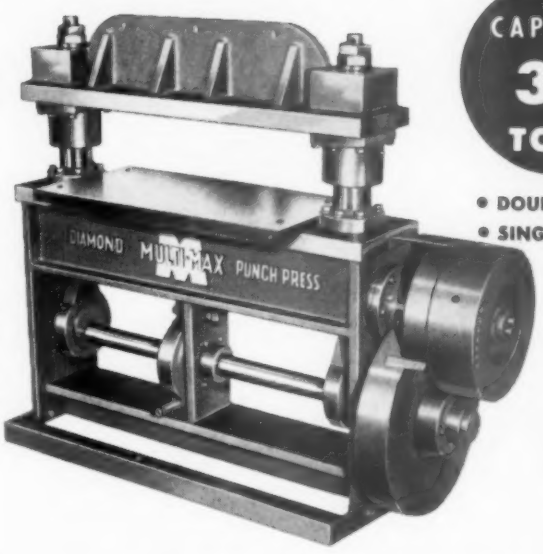
Perfect balance . . . Knurled sides not only assure *positive* grip with "Wedge Grip" to give clearer, deeper impressions—but also lessen severity of extra heavy stamping. Characters available from 1/16" to 1"

Write for Bulletin J-547

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DIAMOND
Multi-Max Punch Press



CAPACITY 30 TONS

- DOUBLE CRANK
- SINGLE GEARED

EXCEPTIONALLY LARGE BED & RAM AREAS

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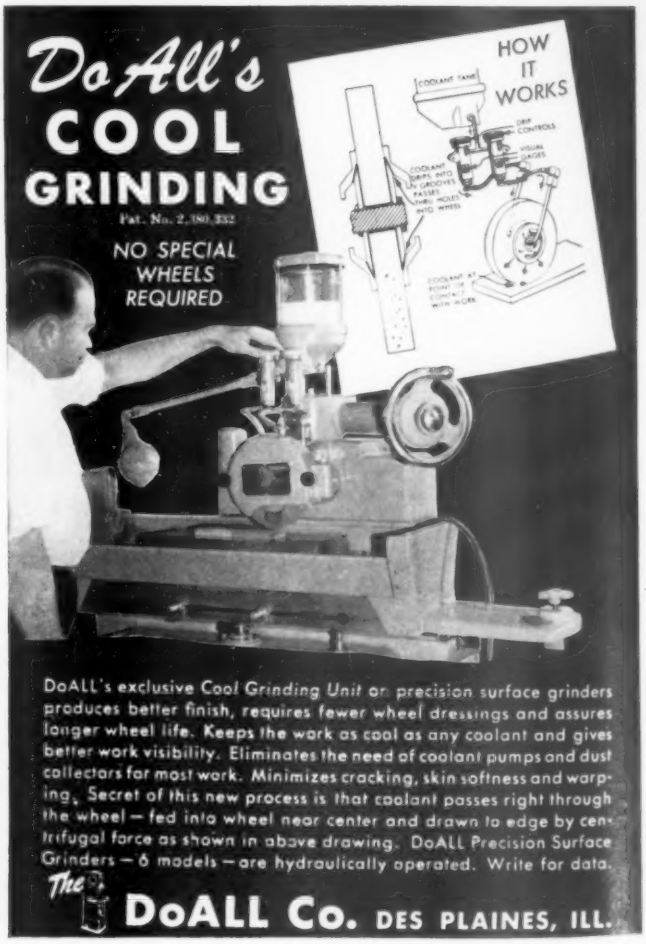
DIAMOND MACHINE TOOL CO.
3427 EAST OLYMPIC BLVD., LOS ANGELES 23, CALIF.
OFFICE AND WAREHOUSE IN CHICAGO



DoAll's COOL GRINDING

Pat. No. 2,180,332

NO SPECIAL WHEELS REQUIRED



DoALL's exclusive *Cool Grinding Unit* on precision surface grinders produces better finish, requires fewer wheel dressings and assures longer wheel life. Keeps the work as cool as any coolant and gives better work visibility. Eliminates the need of coolant pumps and dust collectors for most work. Minimizes cracking, skin softness and warping. Secret of this new process is that coolant passes right through the wheel—fed into wheel near center and drawn to edge by centrifugal force as shown in above drawing. DoALL Precision Surface Grinders—6 models—are hydraulically operated. Write for data.

The DoALL Co. DES PLAINES, ILL.



This progressive die often needed daily redressing before Lehigh H was used. Now the die rarely needs attention more than once in six weeks. And it produces a much better surface on the door knobs which it blanks and draws from .025-in. steel or brass.

Photo courtesy of Skillman Hardware Manufacturing Co., Trenton, New Jersey.

A draw die of Lehigh H assures maximum production in shaping door knob parts on this 35-ton power press.

For maximum production it's LEHIGH H tool steel

"High-carbon, high-chromium" is a brief description of Lehigh H. But it's outstanding as a tool steel for maximum production because it combines these three big features:

★ Maximum Wear-Resistance
★ Air-Hardening for Safety and Minimum Distortion
★ Deep-Hardening with High Compressive Strength

Lehigh H is a tool steel that just can't be surpassed when you have a tool and die job involving one or more of the following requirements: *Long Runs, Close Tolerances, Safe-Hardening, Severe Service.*

Make your tools and dies from Lehigh H for blanking, forming, drawing, punching, shearing and bending. And it's a top-choice steel for lamination dies, shear blades, wearing plates, gages, bending rolls, and the like.

Lehigh H is stocked in popular sizes by Bethlehem Tool Steel distributors in principal cities. The nearest Bethlehem sales office can give you full information. Better still, order a test piece for a trial in your own shop.

Typical Analysis:	C	Cr	V	Mo
	1.55	11.50	0.40	0.80

Working Hardness: Rockwell C-58 to 62

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation

Export Distributor:
Bethlehem Steel Export Corporation

BETHLEHEM STEEL

LEHIGH H . . . one of Bethlehem's Fine Tool Steels

Severance DEBURRING CUTTERS

HIGH SPEED CARBIDE

Unexcelled for power and hand deburring
Sectional pattern teeth give shearing action

• • • • •

Severance INSIDE DEBURRING CUTTERS

GROUND from the solid

Select 45° High Speed cutters from 28 standard sizes and 30° cutters from 35 sizes—from ¼" to 3" diameters.

45° 30°

Both angles can be supplied in CARBIDE

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GROUND from the solid

For speedy light deburring of rod ends and tubing O. D's., either offhand or in screw machines. Select 30° cutters from 14 standard sizes and 45° cutters from 10 sizes—up to 4 inch diameter.

ANGLES 30° & 45° C/L

Both angles can be supplied in CARBIDE

OUTSIDE CHAMFERING MILLS

Operate in machines to perform heavy chamfering without chatter —in above size range and angles.

HEADQUARTERS FOR DEBURRING AND CHAMFERING TOOLS DEVOID OF CHATTER

Severance HAND DEBURRING CUTTERS

"A Twist of the wrist" easily bites off the bur left by drill or punch.

Ten standard sizes for ¼ to 2" diameters

Write for Bulletin 16-D

Complete REGRINDING Service — by New Tool Craftsmen — Savings are thus multiplied —

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MIDGET MILLS

¼" Shanks

JUNIOR MILLS

LAB MILLS

TUBING GROUP

STANDARD Chamfering

SOLID (For Radius Lip)

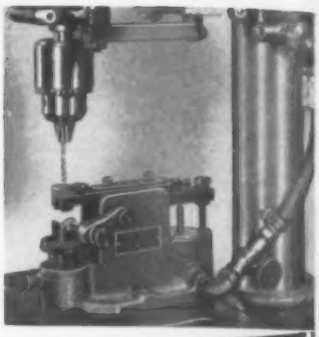
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STANDARD

HEAVY DUTY

BALL SEAT REAMER

Here's a Lead Worth Checking



Por-Matic AIR-OPERATED UNIVERSAL Drilling FIXTURE . . .

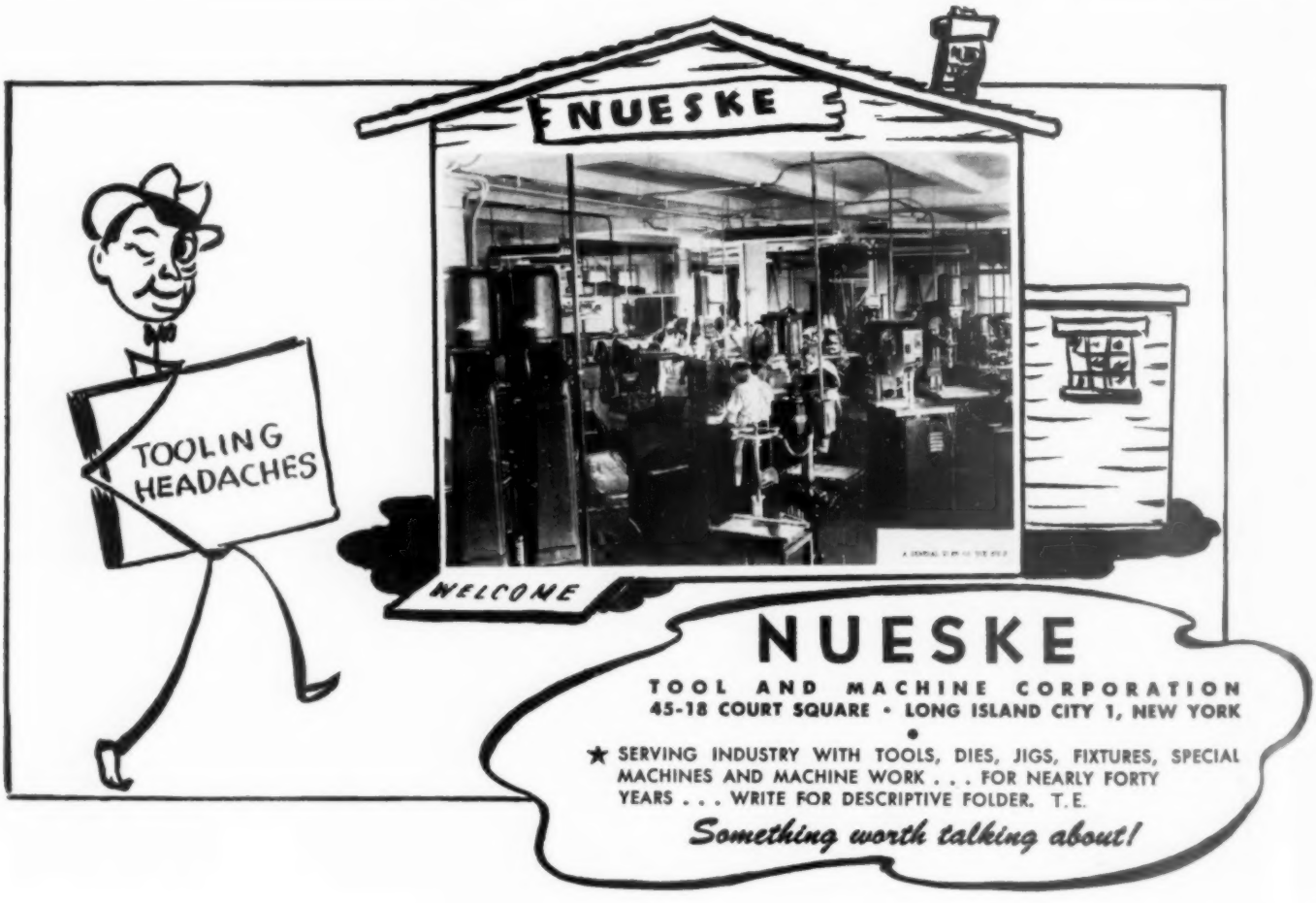
Faster . . . Easier Set-Up . . . with LESS COST . . . that's the story of hole drilling with the Por-Matic Drilling Fixture. Production increases of 33% to 200% . . . and Por-Matic handles ferrous or non-ferrous rounds from 1/16" to 1" . . . extra units are available for drilling special shapes.

Por-Matic can be mounted singly or in groups on any regular bench or floor type drill press. Better check this lead NOW . . . it pays off in PROFITS!

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NUESKE

TOOL AND MACHINE CORPORATION
45-18 COURT SQUARE • LONG ISLAND CITY 1, NEW YORK

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★ SERVING INDUSTRY WITH TOOLS, DIES, JIGS, FIXTURES, SPECIAL MACHINES AND MACHINE WORK . . . FOR NEARLY FORTY YEARS . . . WRITE FOR DESCRIPTIVE FOLDER. T.E.

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PRECISION with STAMINA and *Operating Facility*

JIG BORERS



Small Lot Production

WITHOUT LAYOUT TIME, JIGS OR FIXTURES

Tool Room Production

OF ACCURATE TOOLS, DIES AND JIGS

UNEXCELLED PRECISION is built into every Cleereman Jig Borer by skilled craftsmen who take a personal pride in the quality of their work. And behind their exceptional workmanship is excellence of design, exacting specifications and a manufacturing technique and procedure which assures a precise machine tool.

STAMINA maintains this in-built precision through a long life of extremely accurate work. Specially processed and tested materials, properly matched, combat wear of ways and secure stability.

OPERATING FACILITY has long been accepted as characteristic of all Cleereman machine tools. Convenient, time saving grouping of controls aids appreciably in producing more work. Prepositioning power rapid traverse or electronic traverse and milling control accessories speed operation.

WIRE OR WRITE for catalog with complete specifications.

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CLEEREMAN MACHINE TOOL CO. Green Bay, Wis.

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

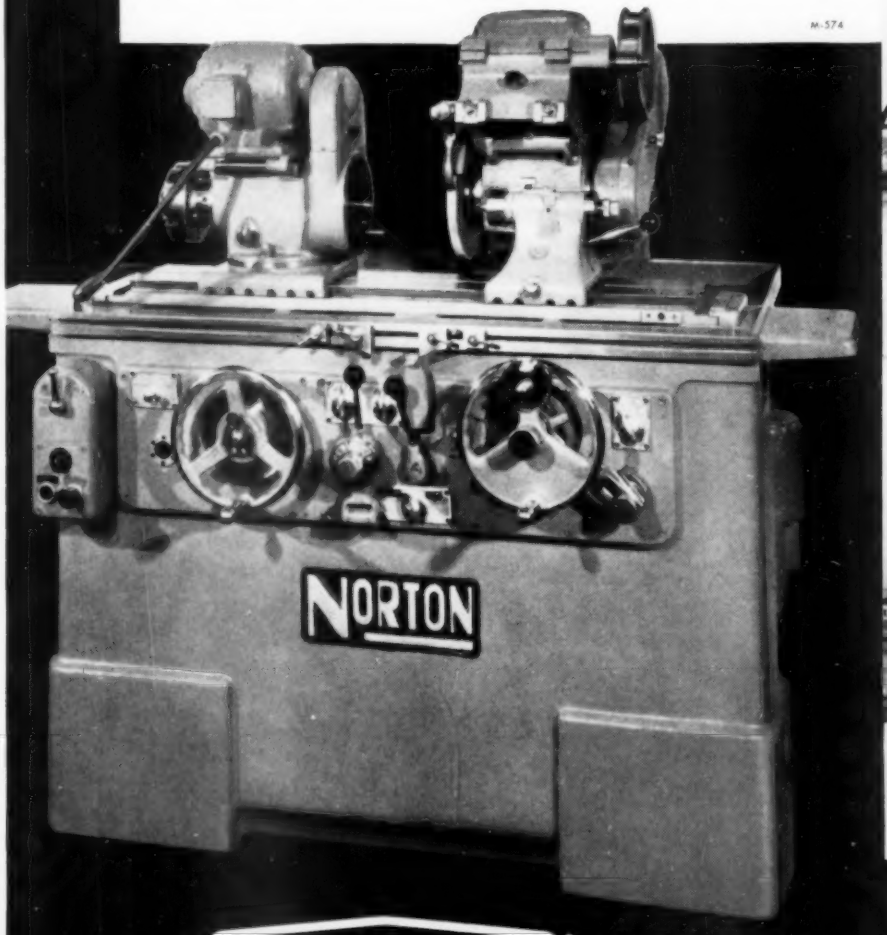
Here's a Handy, *Flexible* Machine *for* TOOL ROOM *and* PRODUCTION WORK ...*It's the new* NORTON 10"×20" UNIVERSAL

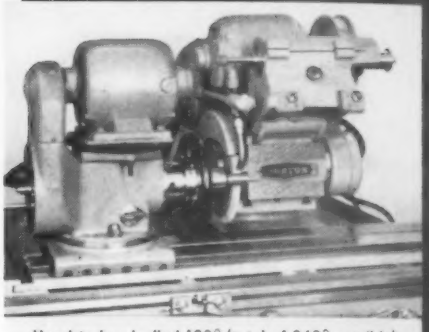
Featuring

1. **FLEXIBLE Double-end Headstock**
2. **FLEXIBLE Double-end Wheel Mount**
3. **FLEXIBLE Set-ups for Cylindrical Grinding**
4. **HANDY Internal Grinding Attachment hinged to front of Wheel Slide**
5. **FLEXIBLE Compound Swivel Wheel Slide**
6. **HANDY closely grouped controls**

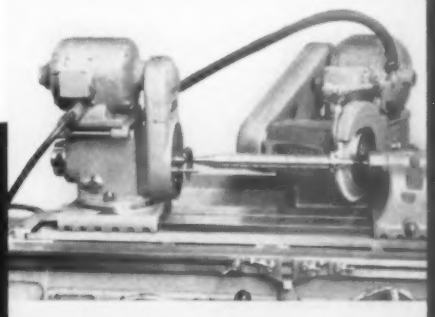
This NEW, flexible NORTON Universal will bring economy to your jobs that require a multipurpose machine of this capacity. It is precise and dependable. Work speed changes from 50 to 500 r.p.m. by fingertip electronic control. Outstanding ease in handling makes it a "must" in tool room equipment programs. A brand new catalog—No. 170-2—tells the complete story. Write for a copy to NORTON COMPANY, WORCESTER 6, MASS.

M-574

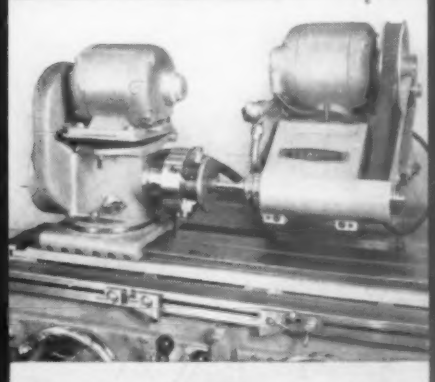




Headstock swivelled 180° (total of 360° possible) for use of conventional or speed chucks. Note center and driver at other end for center type operations.



Grinding wheel can be mounted on the right end of the spindle whenever the nature of the job makes this either desirable or necessary. See view above for normal mounting.



Internal grinding with Norton 10" x 20" Universal. Note compact sturdiness of hinged type Internal Grinding Attachment which is quickly brought down into grinding position.

NORTON® GRINDERS and LAPPERS

THE
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IN
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ACCO

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ARMALOY
Cast Alloy
Bits and Blades



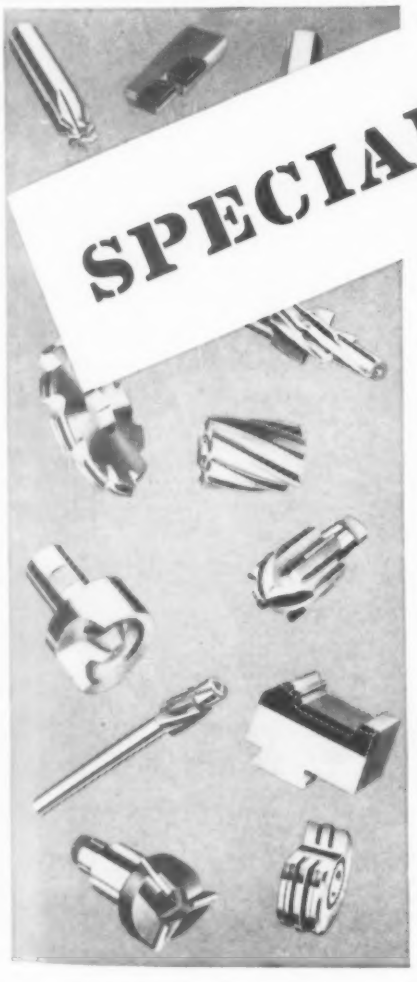
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ARMSTRONG
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Index of Tool Engineer Advertisers

APRIL 1949

A

Acme Industrial Co. 114
Acme Tool Co. 108
Allegheny-Ludlum Steel Corp. 2
American Broach & Machine Co. 85
American Drill Bushing Co., Inc. 106
F. E. Anderson Oil Co. 98
Armstrong Bros. Tool Co. 125

B

Baird Machine Co. 114
Barber-Colman Co. 91
John Bath Co., Inc. 6
Bausch & Lomb Optical Co. 113
Bay State Abrasive Products Co. 14
Chas. H. Besly & Co. 86
Bethlehem Steel Co. 121
A. H. Bowlzer Mfg. Co. 126
Brown & Sharpe Mfg. Co. 95
Bryant Machinery & Engineering Co. 123

C

Cadillac Cutter Co. 126
Carboloy Co., Inc. 109
The Carborundum Co. 104-105
Chicago-Latrobe Twist Drill Works 115
Columbia Tool Steel Co. 108
M. E. Cunningham Co. 120
The Cushman Chuck Co. 119

D

Danly Machine Specialties, Inc. 69-99
The Delta Mfg. Division 67
Detroit Reamer & Tool Co. 102
Diamond Machine Tool Co. 120
The DoALL Company 120
The Dykem Company 98

E

Ex-cell-o Corp. 127

F

Fellows Gear Shaper Co. 126
Firth-Sterling Steel & Carbide Corp. 66
Fuller Tool Co. 118

G

Gammons-Hoaglund Co. 114
Gatco Rotary Bushing Co. 98
Gisholt Machine Co. 101
Gorham Tool Co. 125
Herman A. Graff Sons, Inc. 106
Grob Brothers 120

H

Handy & Harman 112
Hannifin Corp. 128
Hardinge Brothers, Inc. 3
Hartmann Mfg. Co. 71
Hauser Machine Tool Corp. 71
The Heald Machine Co. 116

I

Illinois Tool Works 93
Industrial Enterprises, Inc. 71
J & S Tool Co., Inc. 118

K

Kennametal, Inc. 7

L

Langelier Mfg. Co. 126
The R. K. LeBlond Machine Tool Co. 87

M

Majestic Tool & Mfg. Co. 117
Michigan Tool Co. 88
A. Milne Co. 76
Morse Twist Drill & Machine Co. 12-13
Motch & Merryweather Machinery Co. 96

N

National Broach & Machine Co. 107
National Twist Drill & Tool Co. 4-5
New Britain Machine Co. ..... Inside Back Cover
Niagara Machine Tool Works 10-11
Norton Company 9-124
Nueske Tool Machine Corp. 122

O

Ohio Knife Co. 77
O'Neil-Irwin Mfg. Co. 70

P

Pope Machinery Corp. 89
Positive Safety Mfg. Co. 73
Potter & Johnston ..... Subsidiary of Pratt & Whitney Division of Niles-Bement-Pond Co. 97
Porter Machine Co. 122
Pratt & Whitney Division Niles-Bement-Pond Co. ..... Inside Front Cover

R

R & L Tools, Inc. 94
Reed Rolled Thread Die Co. 69
Rockford Magnetic Products Co., Inc. 74
Ross Operating Valve Co. 75
Royal Oak Tool & Machine Shop 68
Ruthman Machinery Co. 106

S

Geo. Scherr Co., Inc. 98
Scully-Jones and Co. 111
Seneca Falls Machine Co. 84
Severance Tool Industries, Inc. 122
Sheffield Corp. ..... Back Cover
Sheldon Machine Co., Inc. 65
Siewek Tool Co. 63
Simonds Saw & Steel Co. 90
Snyder Tool & Engineering Co. 92
Spuck Iron & Foundry Co. 110
Standard Pressed Steel Co. 100
The L. S. Starrett Co. 8
Stokerunit Corp. 83
Strong, Carlisle & Hammond Co. 100
D. A. Stuart Oil Co., Ltd. 70
P. A. Sturtevant Co. 108
Super Tool Co. 79
Swartz Tool Products Co., Inc. 118

T

The Henry G. Thompson & Son Co. 80
Thomson Industries, Inc. 72
Thriftmaster Products Corp. 81

U

Universal Engineering Co. 103

V

The Van Keuren Co. 100

W

Wales-Strippit 15
Waukesha Tool Corp. 102
Wendt-Sonis Co. 64
S. B. Whistler & Sons, Inc. 16
Wilson Mechanical Instrument Co. 125
Winter Brothers ..... 4 & 5
N. A. Woodworth Co. 78

Z

W. M. Ziegler Tool Co. 102

Fellows

MACHINES and TOOLS

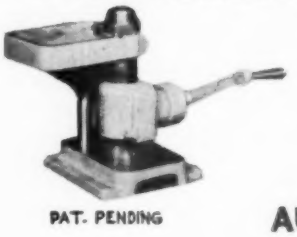
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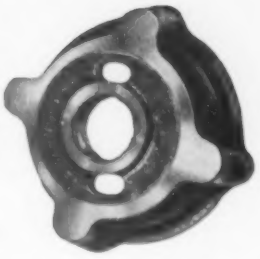
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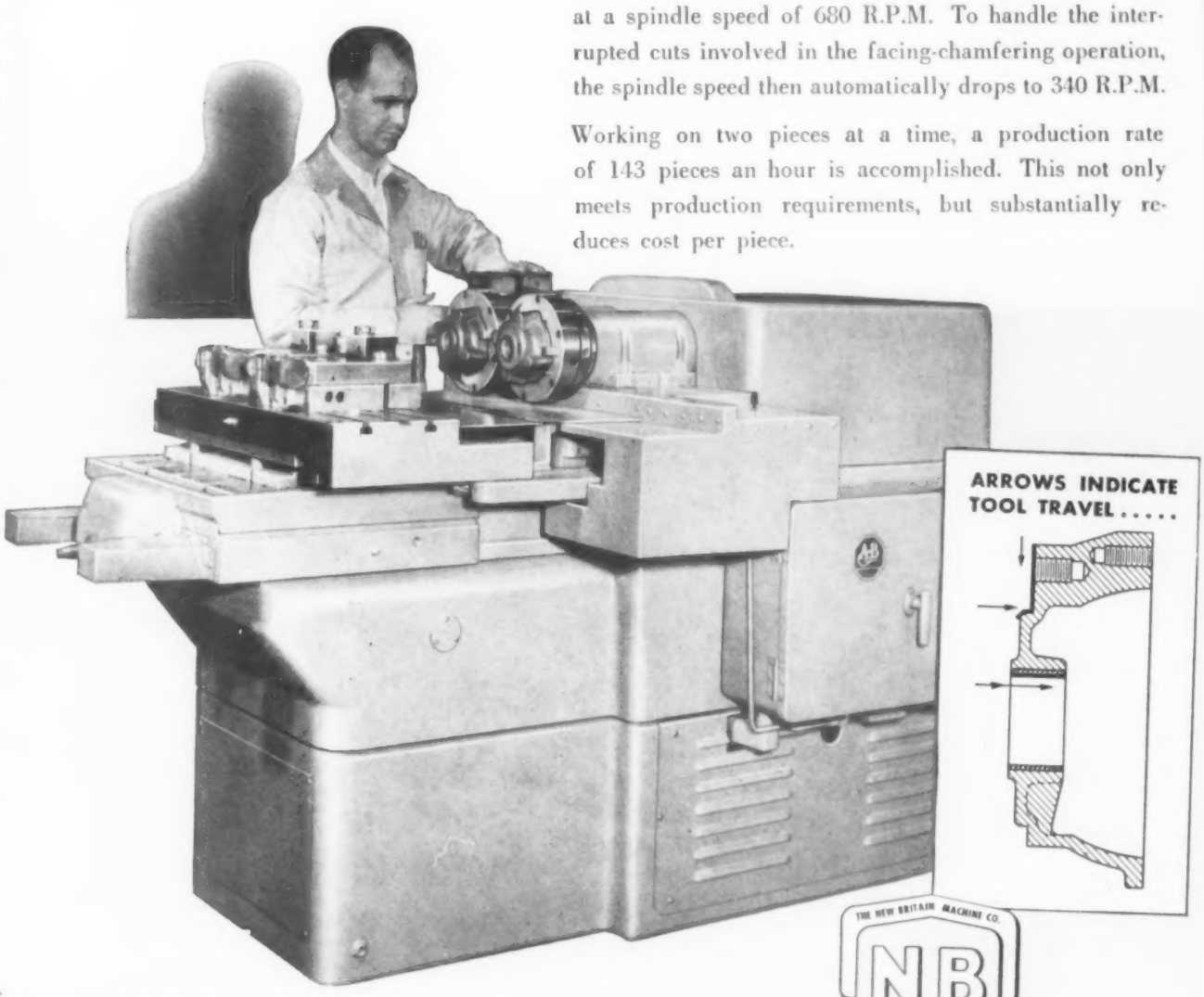
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